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ABSTRACT

The validation of the competency based curriculum (CBC) of the District of Columbia Public Schools, prior to full scale implementation, is described. The CBC includes English, language arts, and science instruction in grades one through nine, and is based upon the demonstrated learning of specific behavioral objectives in the basic skills. The curriculum is individualized and proceeds in a progressive sequence, developing the ability to function successfully in life roles. The design and development of the validation are described, as well as the results which are presented to identify the materials in need of revision or replacement. A number of instructional triads--including behavioral objectives, instructional activities, and assessment tasks--for various competencies and learning hierarchies are presented. The results generally indicate that the implementation of CBC in the Public Schools of the District of Columbia is feasible. This study has shown that: (1) the CBC materials seem generally to appeal to both students and teachers, according to teacher ratings; (2) while the CBC approach provides a useful instructional framework for teachers, it also includes the latitude for the development and implementation of creative approaches to teaching; and (3) the CBC approach provides students with a clear understanding of the behaviors they are expected to acquire. (Author/GDC)

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CHAPTER I. INTRODUCTION AND OVERVIEW

In recent years educators, parents, and others involved in the provision of public education in the United States have become increasingly concerned over the decline in student achievement. In fact, a number of states (e.g., New York, California) have implemented requirements that students demonstrate at least minimum levels of competency as a condition of graduation from high school. Further, the "back to basics" move of the past few years provides additional evidence that, whatever the causes, students in the public schools are not generally learning skills and competencies requisite to successful functioning in their adult years.

Cognizant of these and other problems associated with the educational process, the Public Schools of the District of Columbia in 1976 undertook an innovative approach to education which was designed to assure that students in the system would acquire those skills. This approach, called Competency-Based Education, has as its central objective to facilitate success in and enjoyment of learning by all students, with emphasis on individual rates of growth and individual differences in learning style. It is anticipated that the development and implementation of a competency-based curriculum (CBC) which focuses on basic skills areas, along with extensive community involvement in planning and development activities, will provide the vehicle for achievement of this objective.

A. Overview of the Competency-Based Curriculum

The competency-based curriculum (CBC) developed by the D.C. School System is an individualized, progressive, sequential instructional program based on the use of specific behavioral objectives for which criterion levels of performance have been established. A central objective of this approach to learning is to maximize the potential for each student to function successfully in life roles.

Each of these attributes of the CBC approach is summarized as follows:

1. Individualized curriculum: Each student utilizes an instructional plan developed, in consultation with his teachers, to suit his/her needs, rate of growth, and learning style.

2. Progressive curriculum: The CBC, as developed by the D.C. Public School System, follows an educational structure comprised of a continuum of learning, spanning pre-kindergarten through grade twelve. Thus, a student follows a hierarchy of learning tasks and behavioral objectives across several present grade designations. Each level is designed to lead to the level above it in terms of complexity and required skills mastery. The individual's developmental level, rather than grade level assignment, determines a student's course work.

3. Sequential curriculum: The sequence of behavioral objectives is arranged in a hierarchy, which is followed by the student to reach a specified terminal objective, or mastery level. Students enter the learning hierarchy "competency level" based on a pre-assessment of their skills level in a particular curriculum.

4. Incorporation of behavioral objectives: From the onset of the learning process, each student is informed which objectives are to be accomplished in order to demonstrate mastery of the material. Each of these behavioral objectives is accompanied by two specific instructional activities, designed to exercise the student in the skill to be mastered. Finally, three assessment tasks, structured to require demonstration of the student's

mastery, are administered. Based on the outcome of this assessment the student either progresses to the next objective or cycles back through the current objective with a modified set of instructional activities.

5. Use of criterion levels of performance: Setting goals and objectives is of little utility if no observable metric of achievement is available. Therefore, each assessment task has a specified level of mastery, above which the student "succeeds" at mastering the objective and below which a recycling through the learning process is indicated.

6. Ability to function successfully in life roles: The ultimate goal of the CBC approach is to facilitate students' active participation in society and, as a corollary, to develop a positive self-concept requisite to such functioning.

In addition to these student outcomes, it is also expected that teacher education programs will provide CBC training, school system personnel will have measurable proficiencies in support of student progress, and the community and parents in particular will have a clearer understanding of what is expected of their children and will, thereby, be in a more favorable position to provide first-hand assistance to learners. As the supportive community formulates a constructive role model and set of expectations for its children through its support and involvement in CBC, the children as learners will respond to the role model and expectations, and thereby acquire skills necessary to achieve in school and in life more easily.

The CBC approach to education is structured to include four major components:

1. A behavioral objective specifying the skill to be demonstrated;
2. Learning activities designed to help the student achieve the objective;
3. Assessment tasks structured to measure the amount or degree of mastery of the learning activities; and
4. A learning hierarchy comprised of progressively more difficult behavioral objectives, all of which lead to a terminal objective.

While these four components, and their application in the classroom, are not new to educational systems, the process which the D.C. Public School System has planned and undertaken in order to implement the CBC approach constitutes a major innovation. The process is currently in its third year, and includes mobilization of all teachers, supervisors, and administrators, both regional and central, in the CBC implementation.

B. Implementation of CBC in the School System

A group composed of teachers, regional staff, supervising directors, Washington Teachers' Union and Council of School Officers representatives and Central Office administrators met during 1975-1976 school year and developed "A Design for Competency-Based Curriculum, Pre-K through 12," which was subsequently presented to the Superintendent of Schools in April 1976. Later approval of this document committed the school system to a CBC approach. Three teams were then created in April and May 1976: the CBC Coordinating Team; the CBC Instructional Support Team; and the CBC Implementation Team. These teams were composed of members from the original advisory group which developed the CBC recommendation, plus persons from the different regions in the system. The CBC Coordinating Team was to provide overall leadership and direction for the school system. The Instructional Support Team was to develop a team approach to improving the quality of teaching and learning in the schools, as well as the interaction

of these two processes in the classroom. Finally, the Implementation Team was responsible for facilitating the implementation of CBC-related instructional activities and for mobilizing school system expertise and resources.

One of the first CBC-related educational activities in which the three teams participated was a three-day seminar held at the University of Maryland, and directed by the D.C. Public Schools Leadership Training Program. Dr. Henry W. Walbesser and Dr. William G. Spady, two leading experts in the field of competency-based education, served as consultants. This seminar was designed to explain the concept of competency-based curriculum to the participants. Subsequent to the seminar, a design for implementation was proposed. The 1977-1978 school year was to be the "Year of Commitment." Plans were made and set into motion which would facilitate a smooth transition to competency-based education in the ensuing years. Finally, the 1978-1979 school year was designated the "Year of Implementation." During this period, a District-wide use of the CBC approach will be instituted and refined as necessary.

During the summer of 1976, handbooks for the various "user groups" of the system -- administration, supervisors, and teachers -- were developed and disseminated. Early in September 1976, a general orientation session was held for all teachers and administrators to clarify the purposes and procedures of the CBC effort. The Division of Research and Evaluation (DRE) began evaluating the staff development activities soon after this orientation session. Ratings were solicited from each school with respect to the number of CBC sessions attended, the efficacy of the sessions, the usefulness of CBC materials distributed to participants, and further CBC information and training needs. Results were compiled and reported to the Superintendent of Schools and the CBC Coordinating Team.

Awareness workshops were held throughout the 1976-1977 school year for the three supervisory teams. In the middle of the school year, the Division of Research and Evaluation designed and disseminated a monthly assessment form for each school to complete. This form included questions regarding the degree to which the school had established a CBC team and the status of the team's plans for instructional support, the provision of staff development, monitoring, the establishment of a liaison between the regional office and the school, needs assessment, and community participation. The data from each school for each of the months January through May were accumulated both numerically and graphically. This approach permitted an estimate to be made of the individual progress of a school in the CBC awareness process, and of the entire school system as it was reflected in the trends noted by groups of individual schools. The CBC Coordinating Team was informed of monthly results as soon as they became available and also of the accumulating total. Midway in the spring semester of the 1976-77 school year, the Division of Research and Evaluation also sent out a survey to each school requesting very specific information about the points covered in the monthly surveys. All of the data collected this semester were compiled into a report and presented to the Superintendent of Schools, the CBC Coordinating Team, and the Office of Instruction.

A major component of the preparation for CBC implementation was the provision of two CBC courses during the Summer of 1977 to teachers in the school district. One of the courses was a curriculum writing course based on CBC concepts. Participants were selected on the basis of their experience in the areas of curriculum writing and curriculum development. At the end of this course, some of the participants were selected to help the curriculum specialists write the CBC materials to be used during the 1977-1978 pilot year.

The second CBC course was designed to assist instructional personnel in acquiring the necessary competencies and skills to plan, initiate, and implement competency-based curriculum in individual classrooms, schools and the total educational setting. Members of the CBC teams from each school attended this course, which was offered four times during June and July.

The Division of Research and Evaluation evaluated the two courses. The following two comprehensive reports are available: "An Evaluation of the Competency-Based Curriculum Summer In-Service Course, 'Foundations of Curriculum Writing'" and "An Evaluation of 'Foundations of Curriculum Writing' A Summer In-Service CBC Staff Development Course."

C. The CBC Validation Effort

As is indicated by this review of activities associated with the development of the CBC approach, a number of offices in the school system spent a considerable amount of time and resources in the planning and development phases of CBC. An integral part of this process was the validation of the CBC curricula in Pilot Schools during the 1977-1978 school year. The major objectives of the validation were to assess the implementation of the CBC process and to validate the curriculum materials which were developed during the Summer of 1977.

The Office of Instruction scheduled a meeting in July 1977 to discuss curriculum validation. Representatives of the CBC Coordinating Team, the Pupil Appraisal Branch, the Division of Research and Evaluation, the California Test Bureau, and consultants attended the meeting. Subsequently, the Superintendent of Schools assigned the responsibility for the validation of the language arts/English and science curriculum materials to the Division of Research and Evaluation. The California Test Bureau/McGraw-Hill was contracted through the Office of Instruction to validate the reading and mathematics curricula.

In early August 1977, Dr. Mildred P. Cooper, Assistant Superintendent for Research and Evaluation, assembled a Validation Design Group, (VDG) consisting of Division of Research and Evaluation personnel, a representative of the Office of Instruction and of the Pupil Appraisal Branch and two consultants. The VDG considered various approaches to curriculum validation. After much study and discussion the VDG established the validation strategy based on a rationale which included the following:

> The principles that are applied in the development of competency-based curricula directly influence activities to be included in a complete curriculum validation process. Just what does a "complete validation" mean? A simplistic view of completeness might be that the decision as to whether a curriculum is effective can be made by examining pretest and posttest results. If the scores are greater on the posttest than on the pretest, then such a strategy would draw the conclusion that the curriculum is working well. This is not true curriculum validation.
>
> The most fundamental reason which belies this argument goes to the heart of what distinguishes annual testing from that which is being developed for competency-based curriculum. Neither a curriculum nor student learning can ever be adequately depicted by merely two scores on some composite measure. Learning is the acquisition of individual behavior; i.e. learning is the mastery of separate recognizable competencies (behavioral objectives). Each separate competency must be taught. Each separate competency must be learned. The acquisition of each separate competency must be independently verified by the validation process. There is simply no shortcut to the examination of each distinct behavior and no shortcut to the evaluation of each behavior's acquisition.

The validation strategies derived from the above rationale enable one to accomplish an independent verification of the compatibility of the instructional triads (one behavioral objective, two instructional activities, three assessment tasks) and the learning hierarchies with the concept of competency-based curriculum. The strategies are explained in Chapter II.

During the course of several subsequent meetings of the Validation Design Group, various instruments were designed to be used in the validation effort. The instrumentation included a CBC curriculum material review checklist, used by the curriculum writers prior to disseminating the material; an Observation Checklist, used by the principal in the Pilot School in observing the teachers implementing the CBC program; the Teacher Feedback Form, used by the teacher for data on details on the curriculum materials being used; and the Student Participation Form, on which the teacher indicated the level of participation within the classroom.

D. Organization of This Report

The remainder of this report is organized into three additional chapters and the appendices. Chapter II treats specifically the task of the validation of language arts/English and science curriculum materials and the monitoring of the CBC validation effort. The instrumentation which was developed is presented and DRE's efforts in executing its responsibilities and the CBC thrust are delineated.

Chapter III presents the results of the Division of Research and Evaluation's analyses of the validation data. In addition to a simple display of the data, the outcomes are discussed. Finally, Chapter IV examines implications and presents conclusions.

CHAPTER II. VALIDATION DESIGN AND DEVELOPMENT

A. Introduction

An integral phase of implementing a new educational approach in a large urban school system is the conduct of various assessment activities designed to determine, prior to full-scale implementation, the efficacy of that approach. Assessment activities relevant to implementation of competency-based curriculum (CBC) in the schools of Washington, D.C., included validation of the competency-based curriculum materials and monitoring of CBC implementation. The overall purpose of these activities was to provide the school system with information about the validity of the CBC materials. The validation and monitoring activities associated with the CBC implementation process in language arts/English and science were assigned to the Division of Research and Evaluation (DRE), a part of the Office of the Superintendent of the D.C. Public Schools.

As with other phases of the CBC implementation process, tasks assigned to Division of Research and Evaluation required great expenditure of effort in several areas, including planning, development of appropriate strategies, instrumentation, conduct of curriculum validation and monitoring activities, and analysis and reporting of results. Subsequent sections of this chapter provide detailed descriptions of the processes undertaken and the procedures developed to accomplish the tasks assigned to the Division of Research and Evaluation. Included in later sections of the report are a presentation and analysis of the results.

B. Validation of Language Arts/English and Science Curricula

During the initial phases of CBC implementation in the D.C. schools, CBC-oriented curricula in four content areas -- language arts/English, science, reading, and mathematics -- were developed.[1] The Division of Research and Evaluation was assigned the validation of specifically the language arts/English and science curricula on a pilot basis during the 1977-78 school year.[2] The task of curriculum validation involves an evaluation of both content and process relative to CBC curriculum materials. In this context "content" refers to subject matter of the curricula, i.e., language arts/English and science, while "process" refers to the format of the CBC approach. As indicated earlier this format involves structuring each learning event as an instructional triad, which includes a behavioral objective, two instructional activities, and three assessment tasks, and further structuring instructional triads into learning hierarchies characterized by movement from simple to complex behavioral objectives and ending in a terminal objective.

The validation task was accomplished through development of a curriculum validation model; identification of appropriate strategies; development of instruments; conduct of the validation in a sample of schools; data collection, processing, and analysis; and interface with other interested organizations and groups.

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[1]The curriculum development process is described in Chapter I of this report.

[2]The school system currently uses two criterion referenced tests, the Prescriptive Reading Test (PRT) and Prescriptive Mathematics Test (PMT), which were developed with the assistance of the California Test Bureau (CTB) for testing in reading and mathematics. Validation of reading and mathematics curricula was contracted with the California Test Bureau/McGraw Hill, Inc.

1. Validation Design and Development Process. In the Summer of 1977 the Division of Research and Evaluation was assigned the task of validating the CBC language arts/English and science curricula. An initial meeting to discuss validation was held in July 1977 by the Office of Instruction. Representatives of the Office of Instruction, the Division of Research and Evaluation, the Pupil Appraisal Branch, the California Test Bureau, and two consultants, Dr. Harry Walbesser and Dr. Russell Cort, participated. As a result of the discussions, it was agreed that the California Test Bureau would take the responsibility for the validation of the reading and mathematics content areas while the Division of Research and Evaluation would conduct the validation of the language arts/English and science content areas. In early August, Dr. Mildred P. Cooper, Assistant Superintendent for Research and Evaluation, established a Validation Design Group (VDG) for the purpose of developing a validation model, strategies, instrumentation, etc.

The VDG was comprised of staff of the Division of Research and Evaluation, a representative of the Pupil Appraisal Branch of the Office of Instruction, a representative of the Office of Instruction (CBC) and consultants with expertise in the field of curriculum development and validation, (Dr. Henry Walbesser and Dr. Russell Cort). (Subsequently, a representative of the Division of Automated Information Services was added to the VDG and became a permanent member of the group.) The committee met almost daily during August 1977 to develop a validation model, strategies, task completion target dates and responsibilities, and instrumentation required to conduct validation of the CBC language arts/English and science curricula during the 1977-78 school year.

a. Validation Model.[3] The CBC validation model developed during the course of the VDG meetings was presented to the CBC Coordinating Team and the Office of Instruction at the end of the Summer 1977 and was approved for use during the 1977-78 school year for validating the language arts/English and science curricula. The model, which is presented in Figure II-1, indicates the flow of activities in three primary areas, validation design and development, conduct of the validation, and processing and analysis of results. Tasks accomplished in each of these activity areas included the following:

Validation Design and Development

- Assignment of tasks
- Development of validation strategies
- Design and pretest of instruments
- Design of pilot test sample
- Review, revision, and dissemination of curriculum materials
- Design and provision of orientation for pilot test participants
- Conduct of staff development activities
- Design of continuing validation plan

Conduct of the Validation

- Data collection in pilot schools
- Classroom observations
- Interface with participants
- Maintenance of quality control
- Periodic provision of feedback information

Processing and Analysis of Results

- Development of analysis plan
- Development of reporting schema
- Development of computer programs
- Processing and analysis of data
- Provision of information for curriculum modifications as needed
- Reporting

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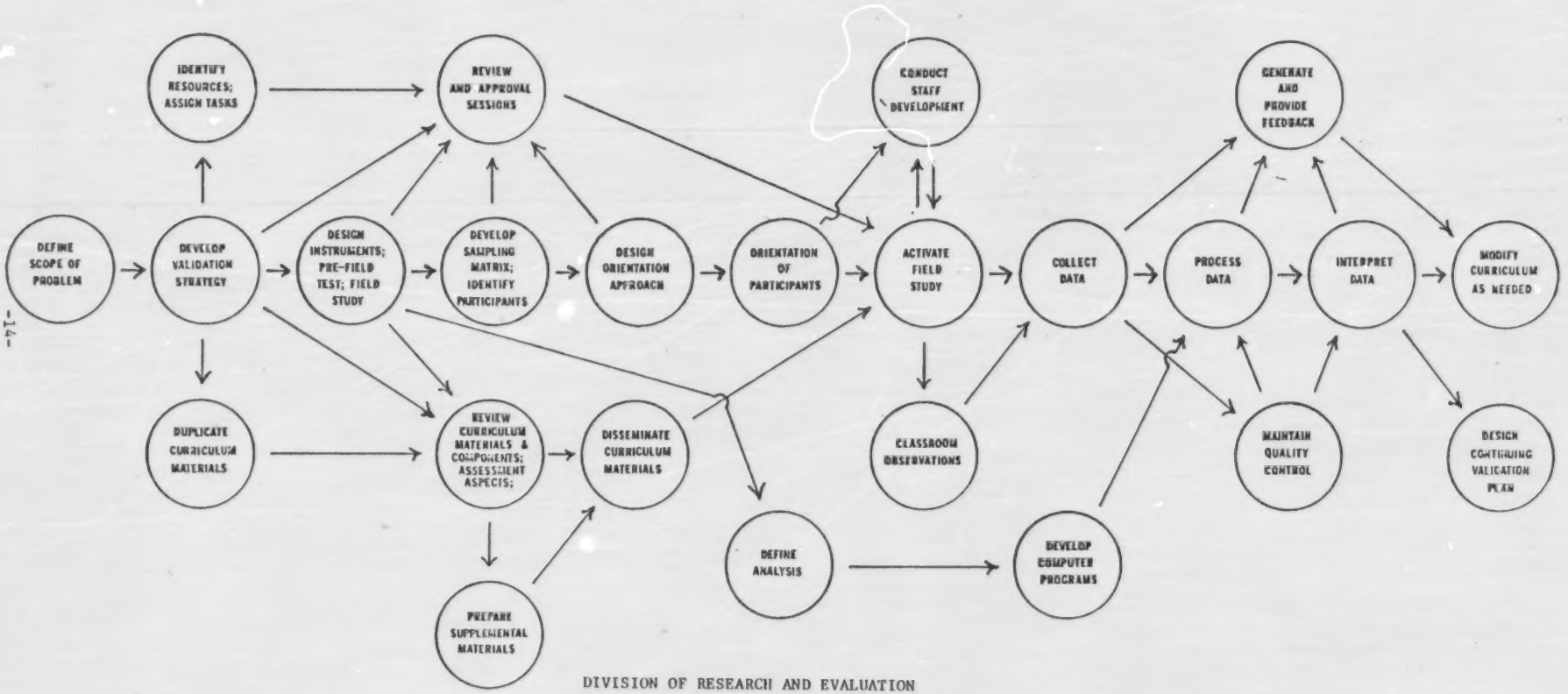
[3]See page 14.

FIGURE II-1

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION

CONTENT VALIDATION MODEL
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE 1977-78



DIVISION OF RESEARCH AND EVALUATION
9/77

Design and development activities were completed from July through October 1977, with the implementation of the validation taking place in the Pilot Schools from 1 November 1977 to 31 March 1978.[4] Processing of the data occurred during the implementation phase in Pilot Schools and through the middle of June 1978. Final analysis and reporting were carried on between the first of May and the middle of July 1978.

b. Validation Strategies. A critical step in the implementation of the curriculum validation model was the development and adoption of strategies for conduct of the effort. These strategies were developed by the VDG during the design phase. The validation strategies included specification of tasks required to complete the validation process successfully, assignment of responsibilities for the performance of tasks and subtasks, and development of target dates for completion of tasks.

Table II-1 indicate tasks, responsibilities, and completion dates which comprised the CBC curriculum validation strategies. As shown in the table, the Division of Research and Evaluation had major responsibility for completion of the curriculum validation effort. Other groups which were responsible for completion of tasks or subtasks were the CBC Coordinating Team, the Pupil Appraisal Branch, the curriculum writers, the Division of Automated Information Services, and principals and teachers in the Pilot Schools where the validation was conducted. Validation strategies were organized such that DRE not only had responsibility for a majority of the tasks involved in the effort but also maintained quality control over the entire language arts/English and science validation through continuous monitoring of all activities associated with the effort.

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[4]Initially the validation was to begin on 1 September 1977. Because the need for curriculum revisions was indicated through the use of the curriculum review checklist, initiation of the validation effort was postponed to 1 November while those revisions were completed.

TABLE
PUBLIC SCHOOLS OF THE
CBC CURRICULUM VAL
FOR LANGUAGE ARTS/E

TASKS	Responsibility of:
1. Assign Task of CBC Curriculum Validation	Supt's Office
2. Define Problem	CBC Coord. Team Res. & Eval. Division Consultants Pupil Appraisal
3. Identify Resources	CBC Coord. Team
4. Develop Validation Design	Res. & Eval. Division
5. Develop Detailed Monthly Schedules	Res. & Eval. Division
6. Duplicate CBC Curriculum Materials	Res. & Eval. Division
7. Develop Task Chart for Each Responsible Group a. Supt's Office b. Div. of Research & Evaluation c. CBC Coordinating Team d. Pupil Appraisal e. Pilot Schools	Res. & Eval. Division
8. Design Instruments a. Develop Curriculum Mat. Rev. Ck. List b. Develop Puissance Index Checklist c. Develop Reading Emphasis Checklist d. Develop SMOG Procedures and Rep. Form e. Develop Teacher Feedback Form f. Develop Teacher Background Form g. Develop Observation Form (cont.)	Res. & Eval. Division

II-14
DISTRICT OF COLUMBIA
IDATION STRATEGIES
NGLISH AND SCIENCE

(Month - Week) Time Frame (1977 - 1978)

Aug.				Sept.				Oct.				Nov.				Dec.				Jan.				Feb.				Mar.				Apr.				May			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
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TABLE
PUBLIC SCHOOLS OF TH
CBC CURRICULUM VA
FOR LANGUAGE ARTS/

TASKS	Responsibility of:
h. Develop Student Performance and Attendance Report Form i. Develop Hypothesis of Learning Dependency Checklist	
9. Develop Sampling Matrix a. Number of teachers b. Number of students c. Subject areas	Res. & Eval. Division
10. Develop Pretests and Posttests for Pilot Schools a. Code and Label Objectives	Pupil Appraisal
11. Monthly Progress Review	Res. & Eval. Division Superintendent's Office
12. Review Curriculum Materials a. Verify that Behavior-Obj. fit Def. b. Verify that Instructional Activities agree with Behavior Objectives c. Verify that Assessment Tasks agree wi h Behavior Objectives d. Determine Reading Complexity Level (SMOG Test) e. Determine Reading Emphasis Level f. Determine Power Levels of Triads g. Check Hierarchy	Curriculum Writers CBC Coord. Team
13. Verification of Assessment Aspects of Curriculum Materials (Cont.)	Pupil Appraisal

II-1
E DISTRICT OF COLUMBIA
LIDATION STRATEGIES
ENGLISH AND SCIENCE

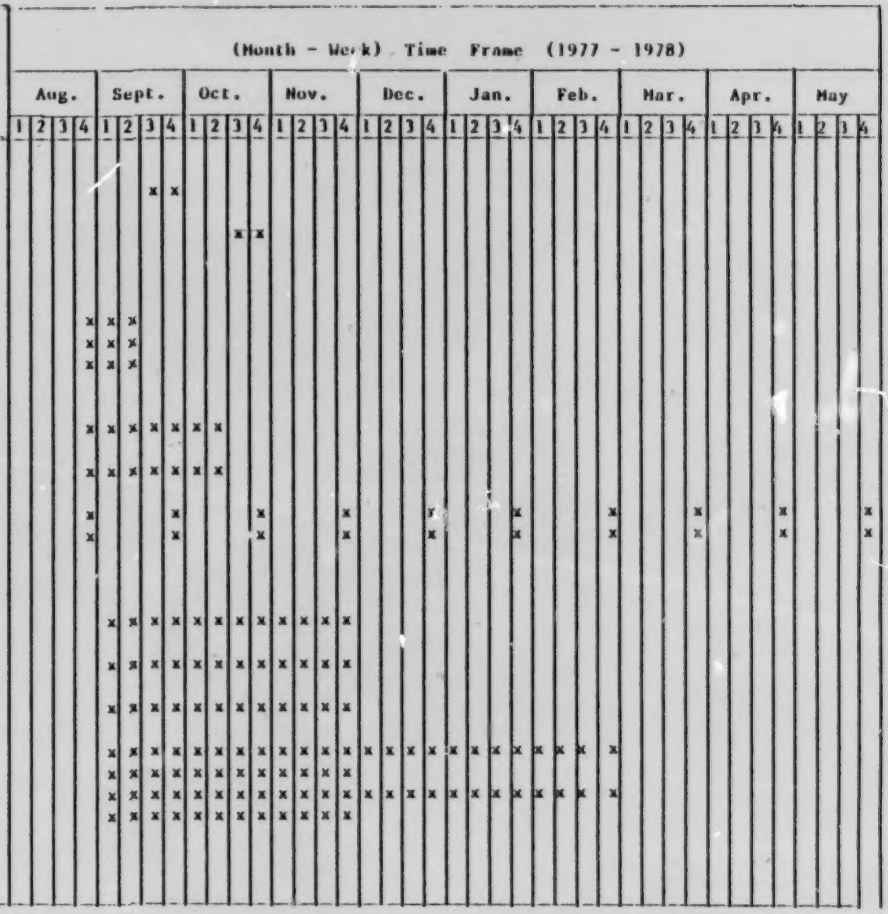

TABLE I
PUBLIC SCHOOLS OF THE
CBC CURRICULUM VALI
FOR LANGUAGE ARTS/EN

TASKS	Responsibility of:
a. Check validity of Assessment Task Items b. Include performance criteria in Behavior c. Develop new Assessment Task as needed d. Disseminate	CBC Coord. Team
14. Prepare Data Collection Schedule	Res. & Eval. Division
15. Implement Sampling Matrix	CBC Coord. Team
a. Teachers b. Students c. Subject Areas	Principals Pilot Schools
16. Conduct Briefings	Res. & Eval. Division
a. For CBC Coordinating Team b. For Central Administration c. For Division of Automated Information Services d. For Regional Assistant Superintendents e. For Administrators and Staff of Pilot Schools	
17. Develop Data Processing Procedures and Report Requirements	Res. & Eval. Division Div. of Automated Info. Serv.
18. Collect Data	(a,d)
a. From CBC Coordinating Team, Pupil Appraisal, Teachers, Counselors	Res. & Eval. Division
(cont.)	

1-1
DISTRICT OF COLUMBIA
DATION STRATEGIES
GLISH AND SCIENCE

(Month - Week) Time Frame (1977 - 1978)

Aug.				Sept.				Oct.				Nov.				Dec.				Jan.				Feb.				Mar.				Apr.				May			
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TABLE I
PUBLIC SCHOOLS OF THE
CBC CURRICULUM VALI
FOR LANGUAGE ARTS/ENG

TASKS	Responsibility of:
b. Maintain Quality Control	(c,d) Pupil Appraisal
c. Compile Data Objective by Objective d. Tabulate Results	
19. Determine Reading Comprehension Level (CLOZE)	(a,b) CBC Coord. Team/ Curriculum Writers
a. Identify Items b. Develop Packages	
c. Develop Sampling Matrix for Package Administration	(b,c,e) Res. & Eval. Division
d. Administer Packages	Teachers
e. Collect, Score and Analyze	Pilot Schools
20. Prepare CBC Supplemental Materials as Needed	Pupil Appraisal
a. Reproduce materials	CBC Coord. Team
b. Disseminate Materials	
21. Conduct Staff Development	CBC Coord. Team
22. Classroom Observation	Principals Pilot Schools or Designees
23. Process Data	
a. Compile Data Objective by Objective b. Maintain Quality Control c. Compute Data d. Generate Printouts	Div. of Automated Info. Serv.
24. Determine the Reliability of Assess. Items	Pupil Appraisal Div. of Automated Info. Serv.
(cont.)	

4-1 c
DISTRICT OF COLUMBIA
DATION STRATEGIES
GLISH AND SCIENCE

(Month - Week) Time Frame (1977 - 1978)

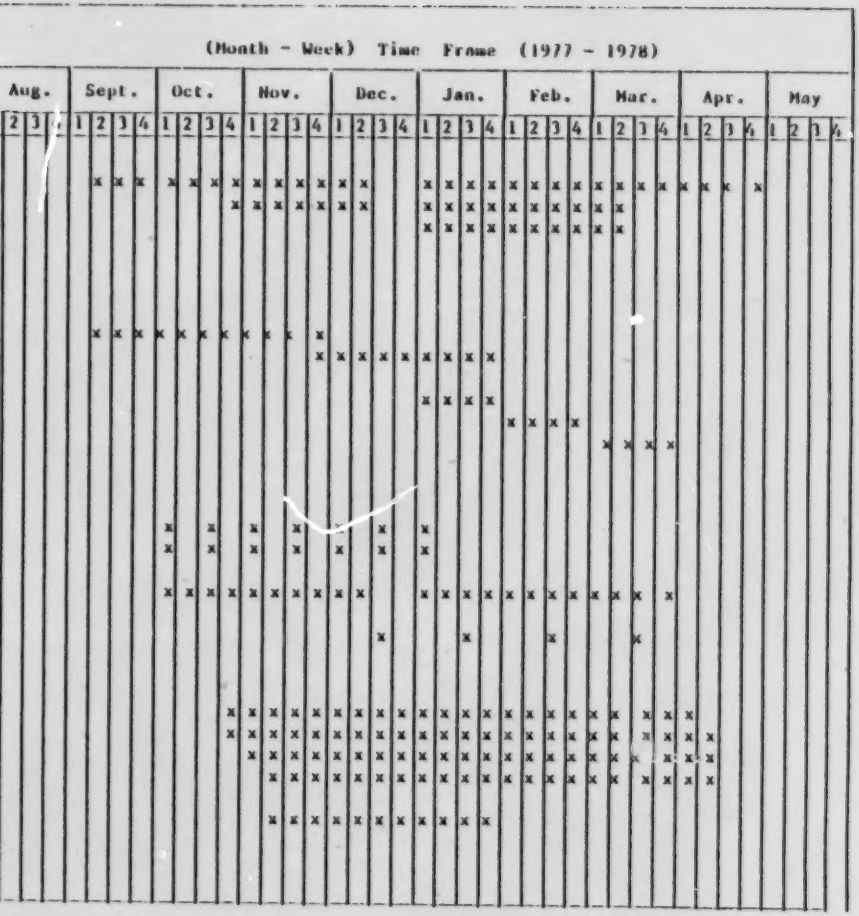
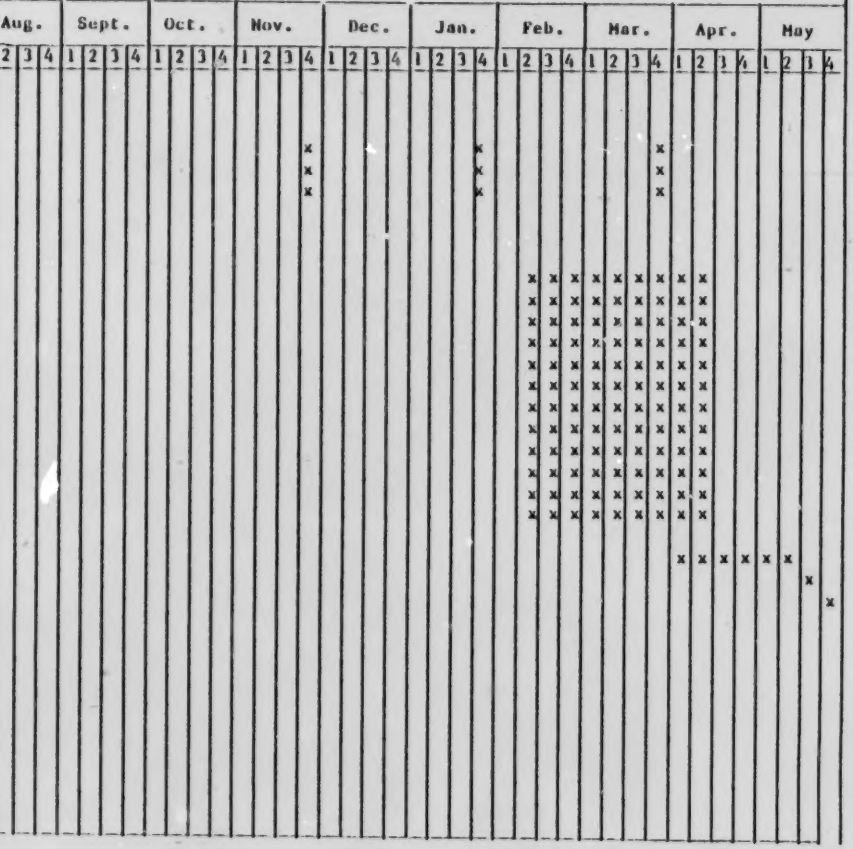


TABLE II-
PUBLIC SCHOOLS OF THE D
CBC CURRICULUM VALIDA
FOR LANGUAGE ARTS/ENG

TASKS	Responsibility of:
25. Provide Feedback	Res. & Eval. Division
a. To CBC Coord. Team b. To Pilot Schools c. To Administration	
26. Analyze Data	Res. & Eval. Division
a. Curriculum Materials Review Data b. Puissance Index Data c. Sampling Data d. Reading Emphasis Data e. Reading Complexity Data f. Reading Comprehension Data g. Teacher Feedback Data h. Teacher Background Data i. Observation Data j. Student Performance and Attendance Data k. Hypothesis of Learning Dependency Data l. Hierarchy Data	
27. Preliminary Draft	Res. & Eval. Division
28. Dissemination	Res. & Eval. Division
29. Report to Public	Superintendent's Office
NOTE: Above validation schedule reflects the completed priority areas curriculum materials as of August 12, 1977.	
Strategies Prepared by Division of Research and Evaluation In Cooperation with CBC Coordinating Team and Pupil Appraisal August 12, 1977 (Adjusted September 12, 1977)	

-1
ISTRICT OF COLUMBIA
ATION STRATEGIES
LISH AND SCIENCE

(Month - Week) Time Frame (1977 - 1978)



c. Instrumentation. During the design and development phase five instruments were designed for use in the curriculum validation. One of these instruments was used for curriculum review prior to implementation, one was for collection of information about teachers' previous experience with CBC, and the other three were data collection instruments used during the conduct of validation activities in the Pilot Schools.

(1) Curriculum Material Review Checklist. The checklist, presented in Table II-2, was designed to permit evaluation of the language arts/English and science curricula prior to the field test in the Pilot Schools during the 1977-78 school year. Each of the curricula was subjected to intensive review by the CBC Coordinating Team, the curriculum writers, subject-area specialists, and staff in the Division of Research and Evaluation who utilized the checklist to evaluate the curricula and to recommend revisions and modifications prior to implementation. The purposes of the review process were as follows:

- To insure that each behavioral objective was written correctly in that it stated WHO was to perform, WHAT was to be performed, the CONDITIONS under which performance was to occur, and the CRITERION for successful performance;

- To insure that, for each behavioral objective, at least two instructional activities were included to provide alternative approaches to learning;

- To insure that, for each behavioral objective, at least three assessment tasks were included and that each called for behaviors to be exhibited that were stated in the behavioral objective;

- To insure that the criteria for acceptable performance were clearly stated in each assessment task and that the criteria were consistent with those stated in the behavioral objectives;

- To insure that the level of reading difficulty was appropriate for the indicated grade level; and
- To insure that each learning hierarchy included an entry level objective, enabling objectives, and a terminal objective.

An additional purpose of the curriculum review was evaluation of the "power" of the instructional triads which comprise the CBC curricula. This task required that each triad be rated as to whether it required the student merely to identify or state a rule learned previously or to solve problems or make inferences based on prior learning. Initially the curriculum reviewers were to complete the entire five-page checklist for each instructional system. Because of time constraints, however, this procedure was later altered, with the reviewers completing Sections I, II, III, VI and VII, and the Division of Research and Evaluation staff completing Sections IV and V.

Based on the review, a number of revisions and modifications were made in the language arts/English and science curricula. As indicated earlier, the necessity for revisions required a delay in implementing the validation process in the Pilot Schools from 1 September to 1 November 1977. Subsequent to the review process, materials were duplicated and disseminated to the schools in time for initiation of the validation study on 1 November 1977.

TABLE II-2
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM MATERIAL REVIEW CHECKLIST
(CBC CURRICULUM VALIDATION)

Completed by_____ Date_____

PART I. IDENTIFICATION DATA

Curriculum Material:

Subject Area _____

Grade Level Range _____ Section _____

Instructional System: (1 Objective + 2 Instructional Activities + 3 Assessment Tasks)

Competency Area_____

Category_____ Level_____

Objective Number _____ Terminal _____ (check) or Enabler _____ (check)

Objective_____

_____

PART II. VERIFICATION OF INSTRUCTIONAL SYSTEM

Directions: Check "yes" or "no" for each item. Use a separate form for each instructional system.

Legend: B.O. - Behavioral Objective
I.A. - Instructional Activity
A.T. - Assessment Task

	Yes	No
A. The Behavioral Objective Fits the Definitions		
1. The Objective states:		
a. WHO is to perform	_____	_____
b. WHAT is to be performed	_____	_____
c. The CONDITIONS or GIVENS under which the instruction will occur	_____	_____
d. The CRITERION for success	_____	_____
2. Action verbs or suggested synonyms from the CBC list are used	_____	_____
B. The Instructional Activities Fit the Definitions		
1. There are at least two I.A.s	_____	_____
2. The I.A.s call for behaviors stated in the B.O.		
a. I.A. #1	_____	_____
b. I.A. #2	_____	_____
c. Other I.A.s	_____	_____
3. The I.A.s offer two different sensory approaches to learning		
a. I.A. #1 SIGHT and a second sense	_____	_____
b. I.A. #2 SIGHT and a second sense different from the second sense used in I.A. #1	_____	_____

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TABLE II-2
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM MATERIAL REVIEW CHECKLIST
(CBC CURRICULUM VALIDATION)

Subject Area_____ Date_____

Grade Level_____ Page Number_____

C. The Assessment Tasks Fit the Definitions	Yes	No
1. There are at least three A.T.s	_____	_____
2. The A.T.s call for behaviors to be exhibited as stated in the B.O.		
a. A.T. #1	_____	_____
b. A.T. #2	_____	_____
c. A.T. #3	_____	_____
d. Other A.T.s	_____	_____
3. Is it true that the A.T.s DO NOT call for behaviors other than the ones in the B.O.?		
a. A.T. #1	_____	_____
b. A.T. #2	_____	_____
c. A.T. #3	_____	_____
4. The criteria for acceptable performance are clearly specified		
a. A.T. #1	_____	_____
b. A.T. #2	_____	_____
c. A.T. #3	_____	_____
5. The criteria are consistent with those stated in the B.O. (OMIT if criterion is not stated in B.O.)		
a. A.T. #1	_____	_____
b. A.T. #2	_____	_____
c. A.T. #3	_____	_____
6. The three A.T.s provide for a varied mixture of task items	_____	_____

PART III. READING EMPHASIS

Do the following activities and tasks require reading on the part of students?

1. I.A. #1	_____	_____
2. I.A. #2	_____	_____
3. A.T. #1	_____	_____
4. A.T. #2	_____	_____
5. A.T. #3	_____	_____

Note: "Reading on the part of students" includes passages, key words, lists, etc., which the student must read in order to respond to the Instructional Activity and/or the Assessment Task.

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TABLE II-2
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM MATERIAL REVIEW CHECKLIST
(CBC CURRICULUM VALIDATION)

Subject Area_____ Date_____

Grade Level_____ Page Number_____

PART IV. SMOG GRADING (Reading Complexity Level)

The SMOG test applies only to material that is to be read by the student. Do not apply the test to materials that are read only by the teacher, word lists, or examples, where it is obvious there is more to come.

For each Instructional Activity and for each Assessment Task that call for reading on the part of the student (see Part III) a SMOG test must be applied provided the materials to be read by the student are included.

Directions: If the materials to be read by the student are included in the I.A. or A.T.:

1. Count 10 consecutive sentences near the beginning of the material to be assessed, 10 in the middle and 10 near the end. Count as a sentence any string of words ending with a period, question mark or exclamation point.
2. In the 30 selected sentences count every word of three or more syllables. Any string of letters or numerals beginning and ending with a space or punctuation mark should be counted if you can distinguish at least three syllables when you read it aloud in context. If a polysyllabic word is repeated, count each repetition.
3. If the material to be assessed has 30 sentences or less count all sentences and all polysyllabic words.
4. Enter the number of sentences counted and number of polysyllabic words counted in the proper box below. The additional computations will be completed by the Division of Research and Evaluation and the Division of Automated Information Services.

Reading Materials	Number of Sentences	Number of Polysyllabic Words	(DO NOT FILL IN) Square Root	SMOG Grade ($\sqrt{\quad}$ + 3)
I.A. #1				
I.A. #2				
A.T. #1				
A.T. #2				
A.T. #3				

5. If there is no material for the student to read included in the I.A. or A.T. and it is obvious that the student is supposed to read something please check here:

I.A. #1 _____
I.A. #2 _____
A.T. #1 _____
A.T. #2 _____
A.T. #3 _____

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TABLE II-2
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM MATERIAL REVIEW CHECKLIST
(CBC CURRICULUM VALIDATION)

Subject Area_____ Date_____

Grade Level_____ Page Number_____

PART V. PUISSANCE INDEX (Power Structure Test)

Directions: Look at each row and column heading on the chart below. Indicate the cell where the Behavioral Objective, each Instructional Activity, and each Assessment Task fall by placing "B.O.", "A.T." or "I.A." in the proper cell(s).

Column Definitions:

Chain - A rote or memory, verbal or nonverbal response, i.e., counting from one to ten, tying a shoelace, etc.

Multiple Discrimination - Teacher supplies a label or name of a class of items, i.e., teacher places a set of different colored circles on the board and requires the student to pick out the blue circle.

Concept - Student supplies the label or single attribute for a set of objects supplied by the teacher, i.e., all are soft, etc.

Principle - Student supplies more than one label or several attributes for a set of objects or the student makes use of a formula or rule.

Problem Solving - Student is presented with a situation which is entirely new and the answer is unknown. Student must apply his/her own rule. Teacher does not tell how it is to be solved.

Row Definition:

The row headings indicate the action required on the part of the student in responding.

(Place "B.O.", "I.A." and "A.T." in appropriate cell(s))

ACTION VERBS	1 Chain Verbal or Nonverbal	2 Multiple Discrimination	3 Concept	4 Principle	5 Problem Solving
1 Name Identify State a Rule					
2 Order Distinguish					
3 Construct Describe Demonstrate Apply a Rule					

TABLE II-2
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM MATERIAL REVIEW CHECKLIST
(CBC CURRICULUM VALIDATION)

Subject Area_____ Date_____

Grade Level_____ Page Number_____

PART VI. HIERARCHY CHECK	Yes	No
As you progress through the curriculum material:		
1. Is there an entry level?	_____	_____
2. Are there enabling objectives?	_____	_____
3. Is there a terminal objective?	_____	_____
4. Is the sequence from simple to complex?	_____	_____

PART VII. COMMENTS OR NOTES

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Prepared by
Division of Research and Evaluation
September 12, 1977

(2) Teacher Background Form. During the month prior to implementation of the CBC curricula, participating teachers in the Pilot Schools were requested to complete a form indicating the extent of their training in the CBC approach, the extent of their teaching experience, and any CBC-related areas in which they desired additional training (Table II-3). This form was developed by the Division of Research and Evaluation at the request of the CBC Coordinating Team and according to their specifications. The purpose of the information on the forms, which were collected and tallied by the Coordinating Team, was to assess the level of CBC training of the CBC pilot teachers. The information collected was used by the Office of Instruction to design staff development activities during the validation period for teachers who were utilizing the CBC curriculum.[5]

(3) CBC Curriculum Validation Observation Form. The first of the three validation data collection instruments designed by the VDG was the observation checklist, to be used by the principal (or a designee) in each Pilot School for observation of the CBC process in each of the participating classrooms (Table II-4). According to the validation design, each participating teacher was to be observed a minimum of four times between 1 November 1977 and 31 March 1978. The purpose of the instrument was to determine the extent to which the CBC approach was being utilized in each of the classrooms participating in the CBC curriculum validation. That is, the observer was to measure the CBC process, and the instructions specified that the instrument was not intended to evaluate the teacher, the classroom, or the effectiveness of the CBC curriculum content.

---

[5] The CBC Coordinating Team developed and conducted a CBC course for participating teachers with the course content based on areas of need identified during this data collection and analysis effort. The course consisted of ten one-hour sessions held monthly from October 1977 through April 1978.

TABLE II-3
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
TEACHER BACKGROUND FORM
(CBC CURRICULUM VALIDATION FOR READING, MATHEMATICS,
LANGUAGE ARTS/ENGLISH AND SCIENCE
SCHOOL YEAR 1977-78)

Teacher Name_____ Room No. _____ School_____

Subject Area_____ Grade_____ Date_____

Directions: This form is to be completed during the month of October 1977 and returned to the Division of Research and Evaluation.

A. Indicate the extent of your CBC training PRIOR to October 1, 1977, by completing the following:

	Type of CBC Training	Number of Sessions	Total Amount of Time in Hours	Place(s) Where Held
1.	Characteristics of CBC	_____	_____	_____
2.	Operational Definition of CBC	_____	_____	_____
3.	Definition of Action Words	_____	_____	_____
4.	Constructing Behavioral Objectives	_____	_____	_____
5.	Identifying Performance Agreement	_____	_____	_____
6.	Constructing Learning (Instructional) Activities	_____	_____	_____
7.	Constructing Assessment Tasks	_____	_____	_____
8.	Determining Entry Levels (Diagnosis)	_____	_____	_____
9.	Interpreting Hierarchies	_____	_____	_____
10.	Student Recordkeeping	_____	_____	_____
	Other (Specify)			
11.	_____	_____	_____	_____
12.	_____	_____	_____	_____
13.	_____	_____	_____	_____
14.	_____	_____	_____	_____

TABLE II-3
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
TEACHER BACKGROUND FORM
(CBC CURRICULUM VALIDATION FOR READING, MATHEMATICS,
LANGUAGE ARTS/ENGLISH AND SCIENCE
SCHOOL YEAR 1977-78)

B. Complete the following:

1. How many years of experience have you had teaching in this subject area?_____. At this grade level?_____

2. Did you participate in writing CBC Curriculum which is being validated? Yes_____ No_____

C. If you feel you need additional CBC training please describe the area and kind of training below.

1.

2.

3.

4.

5.

Prepared by
Division of Research and Evaluation
September 29, 1977

TABLE II-4
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
THE OBSERVATION OF LANGUAGE ARTS/ENGLISH
AND SCIENCE CBC MATERIALS

Pilot School _____

Classroom Teacher _____ Subject Area _____

Room Number _____ Grade Level _____

Date of Observation _____ Observation No. _____

Observer _____ Position _____

Objective Being Taught _____

_____

_____

This observation form is intended to verify the extent to which CBC is being utilized in the instructional program and NOT as an evaluation of the teacher or the classroom.

Directions for Observer

There will be four (4) observations of each classroom during the following time periods:

November 15 - December 15, 1977
December 16 - January 15, 1978
January 16 - February 15, 1978
February 16 - March 15, 1978

For each observation, spend one instructional period in each classroom where Language Arts/English and Science CBC Curriculum Materials are being validated. Complete a separate form for each observation and for each observed objective.

Please check the appropriate response:	Observed	Not Observed	Not Applicable for this Observation
1. There is evidence of pretesting for entry level such as groupings, diagnostic records, and/or teacher/student interaction	_____	_____	_____
2. There is evidence that pretest results have been used to establish different instructional levels.	_____	_____	_____
3. The students are informed of the behavioral objective at the beginning of the lesson	_____	_____	_____
4. The students are engaged in an instructional activity called for in the instructional triad (system)	_____	_____	_____
5. There is evidence of the two instructional activities being taught	_____	_____	_____
6. The students are engaged in an assessment task called for in the instructional triad (system)	_____	_____	_____
7. There is evidence of the three assessment tasks being administered	_____	_____	_____
8. Students are measured on the criterion for performance stated in the assessment task	_____	_____	_____

_____
(Observer's Signature

Prepared by
Division of Research and Evaluation
October 1977

During each observation, the observer was instructed to spend one period in the participating classroom and to complete a separate checklist for each objective being taught during the observation period. Information to be collected included data on use of pretesting, presence of varied instructional levels within the classroom, utilization of the CBC instructional triad as specified by the CBC approach, and the administration of performance assessment activities. These data were to be transmitted to the Division of Research and Evaluation as they were collected for processing throughout the validation effort.

(4) Teacher Feedback Form. A second validation instrument developed by the Validation Design Group was the Teacher Feedback Form (Table II-5), which was designed to collect information for assessing several aspects of the CBC curriculum content from the perspective of the classroom teacher responsible for preparing and teaching the CBC instructional triads. Teachers were requested to complete a feedback form for each of the instructional triads they taught during the validation. Included were questions designed to assess time required for materials planning, preparation, and administration; teacher perceptions regarding appropriateness and clarity of the triads; student responses to the CBC curriculum materials; and possible additional or alternative activities which might enhance the effectiveness of the materials. As with the observation checklist, data collection forms were to be returned to DRE as they were completed.

TABLE II-5
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
TEACHER FEEDBACK FORM
(CBC CURRICULUM VALIDATION FOR LANGUAGE
ARTS/ENGLISH AND SCIENCE,
(SCHOOL YEAR 1977-78)

Teacher Name_____ Room No._____ School_____

Social Security No._____ Grade_____ Subject Area_____

Behavioral Objective Taught_____

_____

_____

Instruction Period[1/] From_____ To_____
(Month/Day) (Month/Day)

Directions: Use this form to provide feedback on each instructional triad.

KEY: B.O. = Behavioral Objective
I.A. = Instructional Activity
A.T. = Assessment Task
Min. = Minutes

A. Approximately how much time did you devote to the activities and tasks? Check one column for each activity and task.

AREA	10-20 Min.	30-40 Min.	50-60 Min.	2-3 Hours	4-5 Hours	6-7 Hours	8-9 Hours	10 or More Hours
1. Planning for instruction								
I.A. #1								
I.A. #2								
A.T. #1								
A.T. #2								
A.T. #3								
2. Preparing materials								
I.A. #1								
I.A. #2								
A.T. #1								
A.T. #2								
A.T. #3								
3. Administering								
I.A. #1								
I.A. #2								
A.T. #1								
A.T. #2								
A.T. #3								

1/ Instruction Period - From the time the Behavioral Objective is introduced to the students until such time as at least 75% of the students complete the last Assessment Task.

TABLE II-5
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
TEACHER FEEDBACK FORM
(CBC CURRICULUM VALIDATION FOR LANGUAGE
ARTS/ENGLISH AND SCIENCE,
(SCHOOL YEAR 1977-78)

B. On a scale of "0" to "4" check the column that most nearly reflects your opinion relative to the components of this instructional triad.

	Not at All 0	1	2	3	Extremely 4
1. Appropriateness to success of instruction					
B.O.	____	____	____	____	____
I.A. #1	____	____	____	____	____
I.A. #2	____	____	____	____	____
A.T. #1	____	____	____	____	____
A.T. #2	____	____	____	____	____
A.T. #3	____	____	____	____	____
2. Clarity for students					
B.O.	____	____	____	____	____
I.A. #1	____	____	____	____	____
I.A. #2	____	____	____	____	____
A.T. #1	____	____	____	____	____
A.T. #2	____	____	____	____	____
A.T. #3	____	____	____	____	____
3. Effectiveness of the Instructional triad	____	____	____	____	____

C. On a scale of "0" to "4" check the column that most nearly reflects the effects of the Instructional Triad on each of the following aspects.

1. Students' interest and enthusiasm	Low 0	1	2	3	High 4
2. Students' attention span during instruction	Short 0	1	2	3	Long 4
3. Students' attitudes toward instruction	Less Favorable 0	1	2	3	More Favorable 4
4. Teachers' attitude toward instruction	Less Favorable 0	1	2	3	More Favorable 4
5. Carry over to other subject areas	None 0	1	2	3	Marked 4

TABLE II-5
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
TEACHER FEEDBACK FORM
(CBC CURRICULUM VALIDATION FOR LANGUAGE
ARTS/ENGLISH AND SCIENCE,
(SCHOOL YEAR 1977-78)

Teacher Name_____SSN_____School_____

D. Instructional triads are meant to be self-contained. If you did use additional materials and/or activities.

1. Please explain why -

2. Please explain what you used -

E. This school year, have you taught the skills represented by this objective prior to teaching this triad to these students?

Yes_____ No_____

F. If there are some alternate instructional activities or assessment tasks that you would suggest for this objective, please describe them below:

G. List any additional comments about the Instructional Triad that you have not reported in previous sections of this feedback form. (If you need more space, please use the back of this page.)

Prepared by
Division of Research and Evaluation
September 29, 1977

(5) Students' Participation Record. The final data collection instrument developed for CBC curriculum validation was the students' participation record (Table II-6). This form was to be used for recording participating students'[6] progress on each of the instructional triads to which they were exposed during the class period. One form was to be completed for each instructional triad, beginning with that triad designated as the appropriate entry level point for participating classrooms at each grade level involved in the validation (one through nine for language arts/English and one through seven for science).

d. Data Analysis Plan. In conjunction with the instrumentation task, a data collection, processing, and analysis plan was developed which would facilitate efficient management of the considerable amount of information to be collected during the validation. This comprehensive plan was developed by the Division of Research and Evaluation staff with assistance from the Division of Automated Information Service (DAIS). Its central components included the following:

---

[6] Students were to be selected from each pilot classroom to participate in the curriculum validation in the following manner: at the time CBC curricula were implemented, all students in each class were to be administered three assessment tasks for the instructional triad immediately preceding the triad designated as entry level for that grade level. All students who mastered all three assessment tasks were determined to be ready for the entry level triad. (Students not ready for this triad were to be administered assessment tasks for earlier triads until their appropriate level was found.) For students ready for the entry level triad, appropriate instruction was to be undertaken on that triad, and these students were the ones to be followed throughout the validation. Additionally, when as many as 75 percent of those students had completed the three assessment tasks, instruction in the following triad was to begin. For those students who were found unable to master three consecutive behavioral objectives, reassignment to appropriate instructional activities was to be made.

TABLE II-6
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
STUDENTS' PARTICIPATION RECORD
(CBC CURRICULUM VALIDATION FOR LANGUAGE
ARTS/ENGLISH AND SCIENCE
SCHOOL YEAR 1977-78)

Teacher Name _____ Room No. _____ School _____

Social Security No. _____ Grade _____ Subject Area _____

Behavioral Objective Taught: _____

_____

_____

Instruction Period 1/: From _____ To _____
(Month) (Day) (Month) (Day)

Directions: Use this form for recording participation for those students in your class who have met the established entry level determined for your grade. Complete a form for each instructional triad. Complete all the information called for. Use the "Key" where appropriate.

Key: Y = Yes, the item was completed by the student
N = No, the item was not completed by the student
I = Incomplete, student was not exposed to this task.
B.O. = Behavioral Objective
I.A. = Instructional Activity
A.T. = Assessment Task

(Check the Appropriate Columns)

Student's Name Last First Init.	Student ID Number	Completed I.A. #1	Completed I.A. #2	Successfully Completed A.T. #1 Y	#1 N	#1 I	#2 Y	#2 N	#2 I	#3 Y	#3 N	#3 I

1/ Instruction Period - From the time the Behavioral Objective is introduced to the students until such time as at least 75% of the students complete the last Assessment Task.

TABLE II-6
(cont.)

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
STUDENTS' PARTICIPATION RECORD
(CBC CURRICULUM VALIDATION FOR LANGUAGE
ARTS/ENGLISH AND SCIENCE
SCHOOL YEAR 1977-78)

Teacher Name_____ Room No._____ School_____

Student's Name			Student ID	Completed I.A.		Successfully Completed A.T.								
Last	First	Init.	Number	#1	#2	#1			#2			#3		
						Y	N	I	Y	N	I	Y	N	I

COMMENTS:

Prepared by
Division of Research and Evaluation
September 1977

(1) Data Collection Arrangements. To facilitate analysis of the validation data in the Spring of 1978, the decision was made to collect data on an ongoing basis rather than at the end of the field test. Consequently arrangements were made for school personnel responsible for completion of the data collection instruments (teachers in the case of the Teacher Feedback Form and the Students' Participation Record and principals or their designees in the case of the Observation Form) to transmit all instruments as they were completed. The principal or designee in each school was responsible for all data collected in that school. Teachers were to place instruments in a box as they were completed, and the principal (or designee) periodically packaged and sent the instruments to DRE for processing.

(2) Data Processing. Prior to actual processing of data, a uniform coding system was developed for all curriculum objectives regardless of subject area. This procedure was necessary because no consistent codes across subject areas existed. The coding system developed by DAIS with assistance from the Division of Research and Evaluation was uniform across subject areas and consequently permits the addition, deletion and revision of CBC curriculum objectives as such steps might become necessary in the future. The processing plan stipulated that as data were received at the Division of Research and Evaluation, DRE staff would code objectives and otherwise prepare the data for transmittal to DAIS.

According to the processing plan, DAIS would receive coded data from DRE and would thereafter have responsibility for keypunching and automated processing of the validation data. As part of this function DAIS, in consultation with DRE, was to develop all computer programs necessary for later analysis of the data, as well as for maintenance of quality control, computation, and generation of computer data printouts in a format appropriate for analysis by the Division of Research and Evaluation.

(3) Data Analysis Plan. The initial decision was made to aggregate the validation data such that they would be analyzed and reported by CBC behavioral objective and not by teacher, principal, or school. This decision was based on DRE's judgment that the validation was to focus on CBC content and process rather than on any potential variations in approach to the CBC curricula.

Data to be analyzed during this phase of the validation included the following:

- Curriculum materials review data
- Puissance index data
- Sampling data
- Reading emphasis data
- Reading complexity data
- Reading comprehension data
- Teacher background data
- Teacher feedback data
- Classroom observation data
- Student performance and attendance data
- Hypothesis of learning dependency data
- Hierarchy data

Data analysis was to be directed toward assessment of the extent to which the CBC process was implemented in the test sites, the extent to which the CBC process was effective in encouraging student learning, and the extent to which the CBC language arts/English and science curriculum materials contributed to the learning of students in those content areas.[7]

e. Selection of Sample. Another task which formed a part of the design and development phase of the validation was selection of a sample for participation in the field test of the CBC curricula. A total of 29 schools throughout the District were selected as Pilot Schools for the test. A list of these schools, which represented appropriate levels of instruction in the system, is presented in Table II-7.

[7] Results of the analyses conducted are presented in Chapter III of this report.

As indicated in the table, the sample consisted of 16 elementary schools, two senior high schools, eight junior high schools, two career development centers, and one special education school.[8]

Criteria used for selection of the Pilot Schools included the following:

(1) Prior agreement by at least one-third of the teachers in the school to:

(a) Undertake training on how to conduct a field test of CBC curriculum materials;

(b) Utilize CBC curriculum materials developed by the curriculum writers;

(c) Conduct pre-post tests of each behavioral objective taught, using assessment materials developed for the CBC curriculum;

(d) Perform critiques of CBC materials used in the classroom, and make subjective evaluations of any classroom problems which might arise; and

(e) Meet with coordinators twice per month (in half-day sessions) to discuss the CBC program and progress, as well as to collate records; and

(2) Prior commitment by administrators in the school to place top priority on providing any support needed to the teachers and students involved in the test of CBC curriculum materials.

---

[8]Although 29 schools were selected as Pilot Schools, the full-scale curriculum validation was conducted in only 24 of the Pilot Schools, with the senior high, career development, and special education schools involved in a somewhat different validation effort. The reason for this variation was as follows: at the time of CBC curriculum implementation (1 November 1977) the number of upper level curriculum materials in the four areas to be validated (language arts/English, science, mathematics, reading) was judged by the CBC Coordinating Team to be insufficient for conduct of the full test. Hence an alternate approach was adopted: test participants at these five schools, with the assistance of the CBC Coordinating Team, conducted a comprehensive review of the available upper level curriculum materials in the four subject areas. Subsequent to the curriculum review, test participants and the CBC Coordinating Team utilized the review results in the development of additional upper level materials for use later at the time of full-scale CBC curriculum implementation in the D.C. Public Schools.

TABLE II-7
PILOT SCHOOLS SELECTED
TO
PARTICIPATE IN THE CBC CURRICULUM VALIDATION STUDY
(SCHOOL YEAR 1977-78)

Elementary Schools

*Adams Elementary School
Bruce-Monroe Elementary School
*Burrville Elementary School
*Drew Elementary School
*Friendship Educational Center
(Elementary and Junior High)
Gibbs Elementary School
*Grimke Elementary School
*J. O. Wilson Elementary School
*Kimball Elementary School
*McGogney Elementary School
*Shaed Elementary School
Thomas Elementary School
*Thomson Elementary School
*Tubman Elementary School
*Washington Highlands Community School
*Webb Elementary School

Junior High Schools

*Backus Junior High School
*Deal Junior High School
*Eliot Junior High School
*Francis Junior High School
*Garnett Patterson Junior High School
*Langley Junior High School
*Sousa Junior High School
*Terrell Junior High School

Senior High Schools

Ballou Senior High School
Woodson Senior High School

Career Development Schools

Bell Career Development Center
Phelps Career Development Center

Special Education Schools

Webster Job Development Center

---

*Indicates 21 schools validating the language arts/English and science curricula.

Following selection of Pilot Schools to participate in the field test, a sampling matrix was developed for selection of classrooms and students in each of the schools to participate in the validation of the four curricula.[9] As indicated in Tables II-8 and II-9, the sampling designs for reading and mathematics and for language arts/English and science differed somewhat. For reading and mathematics (Table II-8) the design required that in each pilot elementary school one class would validate CBC reading, one class would validate CBC mathematics, and one class would serve as a control (i.e., would not utilize either curriculum) at each grade level (kindergarten through sixth grade). In the junior high schools two classes would validate reading, two would validate mathematics, and two would serve as controls at each of the grade levels (seven, eight, and nine).[10]

In the matrix originally developed for the language arts/English and science validating sample, in each school one class was selected for language arts/English and one for science at grade levels one through six, and two classes in each school for each curriculum at grade level seven (Table II-9). Subsequently the decision was made to add grades eight and nine to the sample for language arts/English and to choose two classrooms at these grade levels from each of the participating schools.[11]

---

[9] While DRE was responsible for actual validation of only two of the curricula, the sampling matrix was developed by DRE and the CBC Coordinating Team for all four of the curricula.

[10] According to the field test design, classes which were to validate language arts/English or science could also serve as control classes in the reading-mathematics sample.

[11] The method utilized to choose students in each classroom to participate in the test is described previously in this chapter.

TABLE II-8
CBC CURRICULUM VALIDATION
PILOT SCHOOL SAMPLING MATRIX
FOR
READING AND MATHEMATICS

Elementary Pilot School

Grade Level	Number of Classes			
	Reading	Mathematics	Control	Total
K	1	1	1	3
1	1	1	1	3
2	1	1	1	3
3	1	1	1	3
4	1	1	1	3
5	1	1	1	3
6	1	1	1	3
TOTAL	7	7	7	21

External control classes, one each grade level = 7

Junior High School

Grade Level	Number of Classes			
	Reading	Mathematics	Control	Total
7	2	2	2	6
8	2	2	2	6
9	2	2	2	6
TOTAL	6	6	6	18

External control classes, one each grade level = 3

TABLE II-9
CBC CURRICULUM VALIDATION
PILOT SCHOOL SAMPLING MATRIX
FOR
LANGUAGE ARTS/ENGLISH AND SCIENCE

Grade Level	Language Arts/English			
	Each School		All Schools	
	No. Tchrs.	Objectives to be Taught	No. Tchrs.	Minimum No. Students
1	1		12	100
2	1		12	100
3	1	-Objectives	12	100
4	1	Identified	12	100
5	1	for Each	12	100
6	1	Grade Level-	12	100
	(6)	(Total Elementary)	(72)	(600)
7	2	(Total Jr. High)	(18)	(100)
		Science		
1	1	-Objectives	12	100
2	1	Identified	12	100
3	1	For Each	12	100
4	1	Grade Level-	12	100
5	1		12	100
6	1		12	100
	(6)	(Total Elementary)	(72)	(600)
7	2	(Total Jr. High)	(18)	(100)
Total Elementary Lanugage Arts and Science			144	1200
Total Junior High English and Science			36	200
Grand Total			180	1400

Tables II-10 and II-11 present a schematic representation of the sampling matrix by school. As shown in these tables, in some instances adjustments were necessitated owing to various difficulties encountered during the sampling process. For example, in some elementary schools classrooms were not available to validate the science curriculum (e.g., McGogney, Thomson); in such instances additional classrooms at other elementary schools were selected to validate this curriculum (e.g., Friendship, Drew).

f. Orientation of Participants. The final task of the validation design and development phase was the provision of orientation to participants. Several orientation sessions were to be conducted for participating teachers and administrators in the Pilot Schools shortly before the validation was to begin on 1 November 1977. The purposes of these sessions included the following:

(1) Explanation of the validation strategies,
(2) Distribution of data collection instruments,
(3) Instruction in use of instruments,[12]
(4) Distribution of data collection schedule including delineation of responsibilities,[13] and
(5) Identification of resource persons from DRE and the CBC Coordinating Team who were to be available for assistance with any problems which might arise.

In general, the orientation was provided, prior to implementation of the curriculum validation, to all participants in order to facilitate efficient conduct of the validation effort.

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[12] Table II-12 presents the instructions which accompanied all data collection packages for the validation effort.

[13] Table II-13 provides a listing of validation tasks assigned to principals and teachers and indicates task completion dates and responsibilities for all of the curricula to be validated.

TABLE II-10
CBC CURRICULUM VALIDATION
PILOT SCHOOL SAMPLING MATRIX FOR
READING, MATHEMATICS, LANGUAGE ARTS/ENGLISH, AND SCIENCE

Elementary Schools	Number of Teachers by Subject Areas and Grade Level					
	Kgn	1	2	3	4	5	6
Adams		L	L	L	L	L	L
		S	S	S	S	S	S
Bruce-Monroe		M	M	M	M	M	M
		R	R	R	R	R	R
Burrville		L	L	L	L	L	L
		S	S	S	S	S	S
Drew		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
		S	S	S	S	S	S+S
Friendship		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
		S	S	S	S	S+S	S+S
Gibbs		M	M	M	M	M	M
		R	R	R	R	R	R
Grimke		S	S	S	S	S	S
Wilson, J.O.		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
McGogney		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
		S	S	S	S	(See Friendship)	
Shadd		L	L	L	L	L	L
		S	S	S	S	S	S
Thompson		L	L	L	L	L	L
		S	S	S	S	S	(see Drew)
Tubman		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
		S	S	S	(See Washington Highlands)		
Washington Highlands		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L	L	L
		S	S	S	S+S	S+S	S+S
Webb		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	(See Kimball)	L	L
		S	S	S	S	S	S
Kimball		M	M	M	M	M	M
		R	R	R	R	R	R
		L	L	L	L+L	L	L
		S	S	S	S	S	S
Thomas		M	M	M	M	M	M
		R	R	R	R	R	R
TOTALS M=66		M=11	M=11	M=11	M=11	M=11	M=11
R=66		R=11	R=11	R=11	R=11	R=11	R=11
L=72		L=12	L=12	L=12	L=12	L=12	L=12
S=72		S=12	S=12	S=12	S=12	S=12	S=12

KEY: M = 1 Mathematics Teacher
R = 1 Reading Teacher
L = 1 Language Arts Teacher
S = 1 Science Teacher

NOTE: In most schools where mathematics and reading are, there will be a control class. The Language Arts and/or Science teacher(s) can also be designated as a control class for mathematics and reading.

TABLE II-11
CBC CURRICULUM VALIDATION
PILOT SCHOOL SAMPLING MATRIX FOR
READING, MATHEMATIC, LANGUAGE ARTS/ENGLISH, AND SCIENCE

Junior High Schools	Number of Teachers by Subject Area and Grade Level 1/			Number of Teachers Available Grades 7-9 by Subject Areas			
	7	8	9	Math	Read	Eng.	Sci.
Backus	M+M R+R E+E S+S	M+M R+R	M+M R+R	5		4	4
Deal	M+M R+R E+E S+S	M+M M+M	M+M M+M	8		8	8
Eliot	M+M R+R E+E S+S	M+M R+R	M+M R+R	5		6	4
Francis	M+M R+R E+E S+S	M+M R+R	M+M R+R	4		3	3
Friendship	M+M R+R E+E S+S	M+M R+R	M+M R+R	6		6	5
Garnet-Patterson	M+M R+R E+E S+S	M+M R+R	M+M R+R	2		3	2
Langley	M+M R+R E+E S+S	M+M R+R	M+M R+R	5		6	3
Sousa	M+M R+R E+E S+S	M+M R+R	M+M R+R	3		6	5
Terrell	M+M R+R E+E S+S	M+M R+R	M+M R+R	4		4	2

KEY: M = 1 Mathematics Teacher
R = 1 Reading Teacher
E = 1 English Teacher
S = 1 Science Teacher

TOTALS: M = 54
R = 54
E = 18
S = 18

1/ Two teachers are also needed as a control, one for math and one for reading for each grade level.
This distribution of teachers has not been finalized.

TABLE II-12
CBC Curriculum Materials Validation 1977-78

Instructions for Teachers in Pilot Schools
Language Arts/English and Science

You have a vital role in helping the D.C. Public School System validate the CBC Curriculum Materials. The task is not an easy one, but one that must be done. Your initiative, cooperation and expertise are truly needed and most appreciated.

Teaching Instructions

You will be provided with the CBC curriculum materials for the subject area you have been designated to validate. You will be given the behavioral objective designated as the entry level for your grade as well as the terminal objective you are to work toward this school year. Make every effort, without sacrificing the appropriate CBC instruction and assessment, to reach the designated terminal objective by March 15, 1978.

1. Establish entry levels for your class.

   a. First administer the three assessment tasks (the tasks immediately preceding the instructional triad established as the entry level for your grade) to your entire class.

   b. Those students mastering all three assessment tasks are ready for the instructional triad designated as the entry level for your grade.

   c. Find the entry levels for all students not mastering the three initial assessment tasks by administering the preceding assessment tasks in sequence, in reverse order, until all students have mastered three assessment tasks.

2. Begin instruction with the students (1b) who mastered the entry level for your grade.

   a. Be sure to state the behavioral objective with the students at the beginning of each instructional period.

   b. Teach instructional activity one and then instructional activity two, following the procedures and using the materials suggested in the curriculum materials.

   c. After the students have been instructed using the two instructional activities, administer assessment tasks one, two and three in order and in the manner suggested.

TABLE II-12
(cont.)

CBC Curriculum Materials Validation 1977-78

Instructions for Teachers in Pilot Schools
Language Arts/English and Science

d. After at least 75% of the students who started at your grade's entry level (1b) have completed the three assessment tasks (successfully or unsuccessfully) they are ready for the next instructional triad in the sequence.

e. Those students (1b) who do not successfully master three (3) consecutive objectives are to be reassigned appropriate instructional activities.

Records and Data Collection

To validate the curriculum materials certain data are necessary. As a result you are asked to complete the following instruments. Give the completed instruments to the principal or the principal's designee.

1. The Teacher Background Form - This form is to be completed once only during the month of October. The data will be analyzed and used to plan continuing staff development training to aid you. Please be explicit and specific.

2. The Students' Participation Record - One form is to be completed for each instructional triad beginning with the entry level triad designated for your grade.

   a. First, list alphabetically all the students in your class (last name, first name and middle initial) along with the students' I.D. numbers on the form. On the succeeding forms enter only names and I.D.'s for the students who started at your grade's entry level.

   b. Complete one form for each instructional triad after at least 75% of the students have completed the third assessment task; however, data may be entered as you progress through the instructional triad.

   c. Fill in all identifying data at the top of the form. This is necessary for data processing. Check the appropriate columns for each student introduced to the behavioral objective to indicate his/her status at the time when at least 75% of the students have completed the third assessment task.

   d. A comments section is provided (you may continue the the comment on the back of the form) in case you feel there are facts that need to be reported regarding the students' participation records.

TABLE II-12
(cont.)

CBC Curriculum Materials Validation 1977-78

Instructions for Teachers in Pilot Schools
Language Arts/English and Science

3. Teacher Feedback Form - One form is to be completed for each instructional triad beginning with the entry level triad designated for your grade.

   a. Complete each form after at least 75% of the students have completed the third assessment task; however, data may be entered as you progress through the instructional triad.

   b. Fill in all identifying data at the top of the form. This is necessary for data processing.

   c. In part "A" check the column that most closely represents the amount of time needed for carrying out the CBC instructions for each I.A. and A.T.

   d. For parts "B" and "C" check the column (0 to 4) which most nearly reflects your opinion about each item listed.

   e. The remaining parts of the instrument are provided to enable you to give input about the instructional triad that will help the curriculum writers in revisions, etc., where necessary.

4. If you have further questions or need additional help contact:

   a. Your building principal.

   b. CBC Coordinating Team - Dr. Mary White or Ethel Lewis for Language Arts/English and Mary Harbeck for Science.

   c. Division of Research and Evaluation - Dr. Mildred Cooper, Assistant Superintendent at 724-4246 or Herman Cobb, Director, Evaluation System at 724-4253.

TABLE II-13
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
THE INVOLVEMENT OF PILOT STAFF IN THE VALIDATION
OF
COMPETENCY-BASED CURRICULUM

The Principal or Designee

The principal's role in the validation process involves several components of the Validation Models developed independently by DCPS-DRE and CTB. Both models identify principal involvement in the 1) identification of participants, 2) dissemination of curriculum and materials and 3) orientation and staff development sessions. In addition, the model proposed by DCPS-DRE involves the principal or a designee in classroom observation and data collection aspects of the study. Listed below are the specific tasks the principal must conduct with respect to validation, the date when the task is to be completed, and the aspect of validation with which the task is associated.

Validation Strategy	On or Before Date	LANGUAGE ARTS-ENGLISH AND SCIENCE MODEL (LA-E and Sci.) Task	Principals will:	READING AND MATHEMATICS MODEL (Rdg. and Math) Task	Principals will:
Identification of Participants	11/1	1	assign the required number of teachers at each grade level to the content areas to be validated in the school.	1	Same as LA-E and Sci.
Data Collection	10/27	2	distribute Teacher Background Form to pilot teachers, and collect completed forms.	2	Same as LA-E and Sci.
Material Dissemination	11/1	3	distribute curriculum materials to designated teachers	3	Same as LA-E and Sci.
Classroom Observation	12/1-15	4	In Language Arts/Eng. & Science validation classes, observe CBC activities for each teacher at least once a month to determine whether CBC Triads are being implemented. Observations will be recorded through the use of a checklist labeled Classroom Observation Form developed by the DRE. Observation Forms for each teacher should be collected during the specified period. Four observation periods have been identified.	Not applicable	

Validation Strategy	On or Before Date	Task	Principals will:	Task	Principals will:
Data Collection	Weekly, on Friday	5	in Language Arts-English and Science validation classes, obtain Student Participation Forms and Teacher Feedback Forms from Teachers at designated times and send to DRE		Not applicable
	Ongoing	6	Orientation sessions and responsibilities as necessary		

The Classroom Teacher

The teacher's role in the validation process involves three aspects of the Validation Models developed independently by DCPS-DRE and CTB. These models identify teacher involvement in the 1) activation of the field study, 2) data collection, and 3) staff development. Listed below are the specific tasks the teacher must conduct with respect to CBC validation, the date when the task is to be completed, and the aspect of validation with which the task is associated.

Validation Strategy	On or Before Date	Task	Teachers will:	Task	Teachers will:
Data Collection	11/1	1	bring completed Teacher Background Forms to the pilot teachers' meeting	1	Same as LA-E and Sci.
Activate Field Study	11/2-4	2	determine whether or not each student has acquired entry skills to instructional hierarchies designed for a given grade level. First administer the three assessment tasks (the tasks immediately preceding the instructional triad established as the entry level for your grade) to your entire class. Those students mastering all three assessment tasks are ready for the instructional triad designated as the entry level for your grade.	2	determine whether or not each student has acquired entry skills to instructional hierarchies designed for a given grade level. Entry level for students will be determined from the PRT/PMT reports
Activate Field Study	Ongoing	3	teach each instructional triad according to the mandated sequence identified for a given grade level to each student.	3	teach each instructional triad in the sequence of the hierarchy by the curriculum materials.

(cont.)

Activate the Field Study	Ongoing	4	inform the student of the behavioral objective at the beginning of the lesson, teach only the two instructional activities identified in the curriculum materials and administer the three assessment tasks in order and in the manner suggested. No student should be administered assessment tasks without receiving both instructional materials.	4	state the behavioral objective at the beginning of the lesson, use the two instructional activities recommended, and the three assessment tasks as prescribed. Supplemental materials should be used only after the teacher has made full use of the prescribed instructional activities and assessment tasks and found that the student did not master the objective. The teacher should not do this with any student for whom it is not essential and should consult with the appropriate support person.
Data Collection	Ongoing	5	use the Student Participation Form to list the names of all students in the class, but only record the performance of those students who meet the entry level requirements. On the succeeding forms enter only names and ID's.	5	use the Class Participation Record to identify the students taught objectives and report their performance on the assessment tasks.
Activate the Field Study	Ongoing	6	allow each student who does not master a a particular objective (as determined by performance on assessment tasks) to continue through the next two consecutive instructional triads. If a student fails to master three consecutive objectives, reteach the missed objectives to the student using whatever additional instructional materials are necessary, but discontinue recording the student's performance on the Student Participation Form. Teachers must adhere to these procedures for the purpose of validation.	6	allow each student to master each objective in the sequence before moving to the next objective using whatever additional instructional materials that are necessary

Data Collection	Ongoing	7	after 75% of the students in a class have completed an instructional triad for a given objective, complete for submission the appropriate information on the Teacher Feedback Form describing the preparation and implementation of the instructional triad.	7	use the Teacher's Evaluation Form to record reactions to intructional activities and assessment tasks and the specified hierarchy.
Staff Development	Ongoing	8	attend seminar sessions as indicated	8	Same as LA-E and Sci.

Data Monitors

The role of Data Monitors in the validation process involves the data collection aspect of validation. In addition, Data Monitors will interact with pilot teachers in Reading and Mathematics to clarify the role of the teacher and in an instructional support capacity.

Prepared by
Pupil Appraisal Branch
In Cooperation with
Division of Research and Evaluation
and
CBC Coordinating Team

In summary, design and development activities requisite to successful implementation of the validation effort were conducted by the Validation Planning Group and by the Division of Research and Evaluation staff during the Summer and Fall of 1977. The considerable effort expended on the design phase was critical to the later efficient conduct of the large and complex validation task itself.

2. Conduct of the Curriculum Validation. As indicated earlier in this chapter, the initial phase of validation was a pretest of the CBC curricula. Following the pretest, the validation test was conducted between 1 November 1977 and 31 March 1978. Additionally, a number of interface and reporting activities associated with the validation occurred during this period. Each of these activities is described in the following sections.

a. Pretest of CBC Curricula. The pretest of CBC curriculum materials was conducted in late Summer and early Fall 1977. Its purpose was to insure that all curriculum materials followed the format specified by the instructional triad structure. That is, each segment of the curricula was to be structured such that instructional activities and assessment tasks were characterized by "performance agreement" -- were consistent with the behavior(s) specified in the behavioral objective(s). Additionally, the materials were evaluated for appropriateness of reading complexity. That is, the materials used in any grade level should reflect the level of reading skills which could be expected of a majority of students in that grade. Finally, the materials were evaluated for appropriateness of cognitive skills in order to assure that skills required to perform a behavior were consistent with the content of instructional triad.

The curriculum review was conducted as a sort of double check on the curriculum materials subsequent to their original development. For this reason, the persons initially involved in the development of materials were also involved in the review. These people included the subject area specialists (in language arts/English and science) who served on the CBC Coordinating Team, the CBC Coordinating Team director, and the teachers who served on the Curriculum Writing Team. In all, about ten people participated in the curriculum review pretest.

Initially the validation strategies called for the curriculum review to be completed during the summer prior to CBC implementation on 1 September. Owing to the magnitude of the curriculum writing task, however, the CBC materials were not completed until early Fall. A further lag resulted from the time necessary for typing, editing, printing, and binding of the materials. Consequently the review was conducted essentially simultaneously with the production of the materials, and by the time the review was completed, the materials production was also completed.

This schedule meant that materials revisions based on analysis of the review data had to be incorporated into, rather than replace, the existing materials, which by then (October 1977) had been disseminated to validating teachers in the Pilot Schools. While the number of revisions found to be necessary varied widely among the materials,[14] they were sufficient in number to require development of a uniform procedure for their dissemination and use. As changes were made, the CBC Curriculum Team communicated to each validating teacher the nature of the change. When appropriate, materials were sent to the teachers with instructions on where to insert them in the curriculum booklets and on how to use the new materials.

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[14] Relatively few revisions were found to be necessary to the science curriculum but revisions to the language arts/English materials were fairly numerous. In general, they included substantive changes and deletions of various segments.

As indicated by this review, the CBC curriculum development was an ongoing process which began with curriculum writing, continued with review and revisions, and, as conceived by the CBC Coordinating Team, will continue in the future as the need for revision and modification becomes apparent. One of the major data resources for continuing curriculum revision will be the results of the Division of Research and Evaluation's curriculum validation effort.

b. Validation of CBC Curricula. As noted previously, the CBC validation for language arts/English and science was conducted from 1 November 1977 to 31 March 1978 in 21 schools. Four levels of curricula were validated; elementary language arts, intermediate (junior high) English, elementary science, and intermediate (junior high) science.[15] Conduct of the validation required ongoing data collection, performed by principals (or designees) and participating teachers in the Pilot Schools. Validation data were collected on three instruments, the Classroom Observation Form, the Teacher Feedback Form, and the Students' Participation Record.[16]

Data collection was arranged such that its focus would be on both the CBC process and the content of the curricula being validated. CBC process data were collected on the observation form, which was designed to measure the extent of CBC implementation in each classroom. Additionally, process data were obtained directly via certain of the items[17] on the teacher feedback instrument and indirectly through the student participation form.[18]

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[15] Appendix A presents exemplary materials from the elementary language arts and science curricula.

[16] Each of these instruments is described in detail in an earlier section of this chapter.

[17] Several items requested teacher perceptions concerning the CBC process, including time required to prepare materials according to the CBC approach, view of the CBC structure of instructional triads and learning hierarchies, etc.

[18] The extent to which students continued to be eligible to participate in CBC validation (i.e., continued to complete assessment tasks successfully throughout the test period) may provide an indirect measure of the CBC process.

CBC content was measured via the teacher feedback and student participation forms. Hence both subjective measures -- teacher perceptions concerning adequacy of available materials and reports concerning the need to use additional materials for certain instructional triads -- and objective measures - student success at performing behavioral objectives -- were utilized in the validation. As noted earlier, since the focus of the validation was on the CBC process and curriculum content rather than on specific teacher or student efficiency in utilizing the CBC approach, data collection was organized such that analysis could be conducted by specific behavioral objective (including as well the mechanism to evaluate instructional activities and assessment tasks).

The nature of the validation effort required that data be collected on a continuing basis throughout the validation period. To facilitate the collection of accurate data, teachers completed feedback and student participation records as each triad was prepared, taught/learned, and tested through use of assessment tasks. Ongoing forms completion reduced the likelihood that imperfect recall would cause inaccuracy in the data. As each instrument was completed, it was transmitted to the Division of Research and Evaluation by means of a procedure which was uniform for all schools (described earlier in this chapter).

Throughout the test period members of the CBC Coordinating Team and DRE staff served as resource persons to deal with any problems which might arise during the test period. It was anticipated, however, that the extensive time and effort directed to the design and development phase of validation would substantially reduce the number of problems which might occur. Such turned out to be the case, and throughout the validation the only major problem (whose nature and solution were described in an earlier section) was the necessity to integrate curriculum revisions and modifications into the printed curriculum documents.

c. Other Activities Associated with the Validation Effort. During the test period a number of associated peripheral tasks were performed. These included the development and conduct of a staff development course for participating teachers, the conduct of ongoing planning sessions by the Validation Design Group, and the development of periodic status reports. Each of these activities was considered essential to the validation task as well as important to the anticipated full-scale implementation of the CBC approach at a later date.

(1) Staff Development Course. One of the criteria for teacher participation in the pilot test of CBC curricula was agreement to attend periodic meetings throughout the test period. The CBC Coordinating Team determined that these meetings should take the form of a staff development course designed to provide additional CBC-related training needed by participating teachers. During the design phase, course content was determined in the following manner: the CBC Coordinating Team analyzed data collected on the Teacher Background Form,[19] which was completed by each participating teacher in the Pilot Schools. The teachers had been requested to list specific CBC areas in which they felt they needed additional training, and course content was oriented toward these expressed needs.

Table II-14 presents the outline of the CBC staff development course. As indicated, ten sessions were conducted during the validation period, with the focus of the sessions ranging from broad issues relevant to CBC (e.g., curriculum scope, content, and structure) to specific aspects of various components (e.g., the instructional triad, learning hierarchies, etc.). Throughout the course, flexibility was maintained to assure that particular needs of participants could be addressed as they arose throughout the test (validation) period.

[19] The nature of this instrument is described in an earlier section of this chapter.

TABLE II-14
FOUNDATIONS OF COMPETENCY-BASED CURRICULUM VALIDATION
COURSE OUTLINE

COURSE DESCRIPTION:

The course will follow a seminar format to allow for the flexibility needed to address the individual and group needs of the participants. The ten sessions will address the issues listed below.

Course Objective: At the end of the course, each participant will have conducted instruction for and collected data about a given piece of curriculum material with sufficient thoroughness to make validation possible.

Session I:	ORIENTATION	October 12, 1977 October 13, 1977
Session II:	THE CURRICULUM: OVERVIEW OF SCOPE, CONTENT, AND STRUCTURE	November 1, 1977
Session III:	THE CURRICULUM: DATA COLLECTION AND REPORTING	November 22, 1977
Session IV:	THE CURRICULUM: VERIFICATION OF THE INSTRUCTIONAL TRIAD	December 6, 1977
Session V:	THE CURRICULUM: READING EMPHASIS	January 10, 1977
Session VI:	THE CURRICULUM: POWER OF THE INSTRUCTIONAL TRIAD	January 24, 1978
Session VII:	THE CURRICULUM: TASK ANALYSIS OF THE LEARNING PATH (THE HIERARCHY)	February 14, 1978
Session VIII:	THE CURRICULUM: APPLICATION OF ALTERNATIVE INSTRUCTION	February 28, 1978
Session IX:	THE CURRICULUM: IMPACT UPON INSTRUCTION	March 14, 1978
Session X:	THE CURRICULUM: EVALUATION OF THE CURRICULUM	April 4, 1978

(2) Ongoing Planning Sessions. A second activity which continued during the validation was periodic meetings for planning and assessment of the validation's progress. These sessions included meetings with the following organizations:

- Meetings with validating teachers concerning their progress and needs in respect to the curriculum materials;
- Meetings with the CBC Coordinating Team concerning curriculum modifications and revisions; and
- Meetings with the Pupil Appraisal Branch and the Division of Automated Information Services concerning data analysis.

(3) Reporting. During the validation period the Division of Research and Evaluation staff developed periodic status reports for the Superintendent of Schools and for the CBC Coordinating Team. The purpose of these reports was to inform interested persons of the progress of the validation, to describe any problems which arose and the methods used for their resolution, and to provide information about scheduling of future events. In general, these reports contributed substantially to the coordination and conduct by the Division of Research and Evaluation of the complex validation task in that they enabled DRE and others to monitor closely the accomplishment of various tasks and subtasks.

C. Monitoring of the Curriculum Validation

In addition to reporting and other quality control activities associated with the curriculum validation, the Division of Research and Evaluation was specifically assigned the task of developing and implementing a CBC monitoring plan.[20] A number of different groups had task responsibilities in the validation effort (see Table II-1).

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[20] Validation monitoring was a component of the larger CBC monitoring task assigned to DRE. The overall monitoring activity is described in a separate report. Consequently, in this report description of the monitoring task is confined to those activities with direct bearing on the validation task.

For this reason, a carefully designed monitoring effort was required to assure timely and efficient task completion by all participating agencies. This effort included development of a validation monitoring plan, design of appropriate instruments, and conduct of monitoring activities throughout the validation period.

1. Validation Monitoring Approach and Instruments. The validation monitoring approach was developed by the Division of Research and Evaluation staff in consultation with the CBC Coordinating Team and other groups who were to be involved in the validation task (e.g., DAIS, Pupil Appraisal Branch, etc.). The approach included creation of schedules; assignment of responsibilities for task completion; preparation for monitoring of curriculum implement .on, validation strategies, and evaluation in the Pilot Schools; data collection plans; and analysis and reporting tasks.

Instruments developed for use in monitoring the CBC curriculum validation included the CBC Curriculum Validation Observation Form (see Table II-4) and the CBC Curriculum Validation Strategies Monitoring Form (Table II-15). The observation form was designed to monitor, through direct observation in participating classrooms in the Pilot Schools, the extent to which the CBC curricula were being used in the educational process.

The CBC Curriculum Validation Strategies Monitoring Form was designed to collect information on the extent to which groups responsible for various validation tasks were meeting time schedules, completing tasks successfully, finding it necessary to revise task statements or completion dates, and generally to follow the progress of each validation task. Hence the instruments were to monitor both the actual implementation of CBC materials in the Pilot Schools and the progress on associated validation tasks by persons and agencies responsible for those tasks.

TABLE II-15

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

Report for Month(s) August - November 1977

Critical Task Develop Pretests and Posttests for Pilot Schools

Responsibility Pupil Appraisal Attention: Valeria Ford Language Arts/English and Science

Task Description	Original Completion Date	Current Status of Task ---CHECK ONE---					Report of Current Status Please Describe or List Appropriate Documentation	Constraints on Task	COMMENTS (Modifications, Changes in Completion Date, Reason for Change)
		On Schedule	Behind Schedule	Schedule Modified	Task Completed				

Prepared by Division of Research and Evaluation
November 1977

Signature

2. Conduct of Validation Monitoring. Monitoring of the validation extended throughout the school year. To monitor CBC in the schools, the principals or a designee visited each validating teacher's classroom at least once during the year to verify that the teacher was using the CBC materials and approach. These data were compiled and are summarized in Chapter III.

The validation strategies monitoring instrument was distributed to each group with validation task responsibility at least twice during the validation development and conduct periods (August-November 1977 and January-February 1978). The instruments were completed by task leaders and returned to the Division of Research and Evaluation for analysis. The completed instruments included all documentation relevant to task completion or postponement. Following receipt of completed instruments, during each cycle, the Division of Research and Evaluation staff analyzed the status of all validation tasks and composed a status report on validation task completion for the Superintendent of Schools and the CBC Coordinating Team. The reports were intended to inform decision-makers of the progress of validation as well as to provide information which might be required for any necessary remedial action, (see Table II-16).

As noted earlier, the overall CBC monitoring effort conducted by the Division of Research and Evaluation is the subject of a separate report. For that reason, only a summary of that component of the monitoring task relevant to CBC curriculum validation has been provided in this chapter.

TABLE II-16
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION STRATEGIES
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE

Report for 25 May 1978

TASKS	Responsibility of:	(Month - Week) Time Frame (1977 - 1978)
		Aug. 1 2 3 4 | Sept. 1 2 3 4 | Oct. 1 2 3 4 | Nov. 1 2 3 4 | Dec. 1 2 3 4 | Jan. 1 2 3 4 | Feb. 1 2 3 4 | Mar. 1 2 3 4 | Apr. 1 2 3 4 | May 1 2 3 4
1. Assign Task of CBC Curriculum Validation	Superintendent's Office	x — C
2. Define Problem	CBC Coordinating Team	x x C
	Research & Eval. Division	x x C
	Consultants	x x C
	Pupil Appraisal	x x C
3. Identify Resources	CBC Coordinating Team	x x C
	Research & Eval. Division	x x C
4. Develop Validation Design	Research & Eval. Division	x x - C
5. Develop Detailed Monthly Schedules 1/	Research & Eval. Division	x - C x C x C x C x C
6. Duplicate CBC Curriculum Materials	Research & Eval. Division	x x C
7. Develop Task Chart for Each Resp. Group	Research & Eval. Division	
a. Superintendent's Office		x x C
b. Division of Research & Evaluation		x x C
c. CBC Coordinating Team		x x C
d. Pupil Appraisal		x x C
e. Pilot Schools		x x C
8. Design Instruments	Research & Eval. Division	
a. Develop Curriculum Mat. Rev. Cklist		x x - C
b. Develop Puissance Index Checklist		x x - C
c. Develop Reading Emphasis Checklist		x x - C
d. Develop SMOG Procedures and Rep. Form		x x - C
e. Develop Teacher Feedback Form		x x - C
f. Develop Teacher Background Form		x x - C
g. Develop Observation Form		x x — — C
h. Develop Student Performance & Attendance Report Form		x x - C
i. Develop Hypothesis of Learning Dependency Checklist		x x — — C

(cont.)

KEY: O = Task completed and ongoing -C = Task completed, but not as scheduled
C = Task Completed as scheduled —→ = Task incomplete; behind schedule

1/ Modified: A validation monitoring form was developed to document status of tasks.

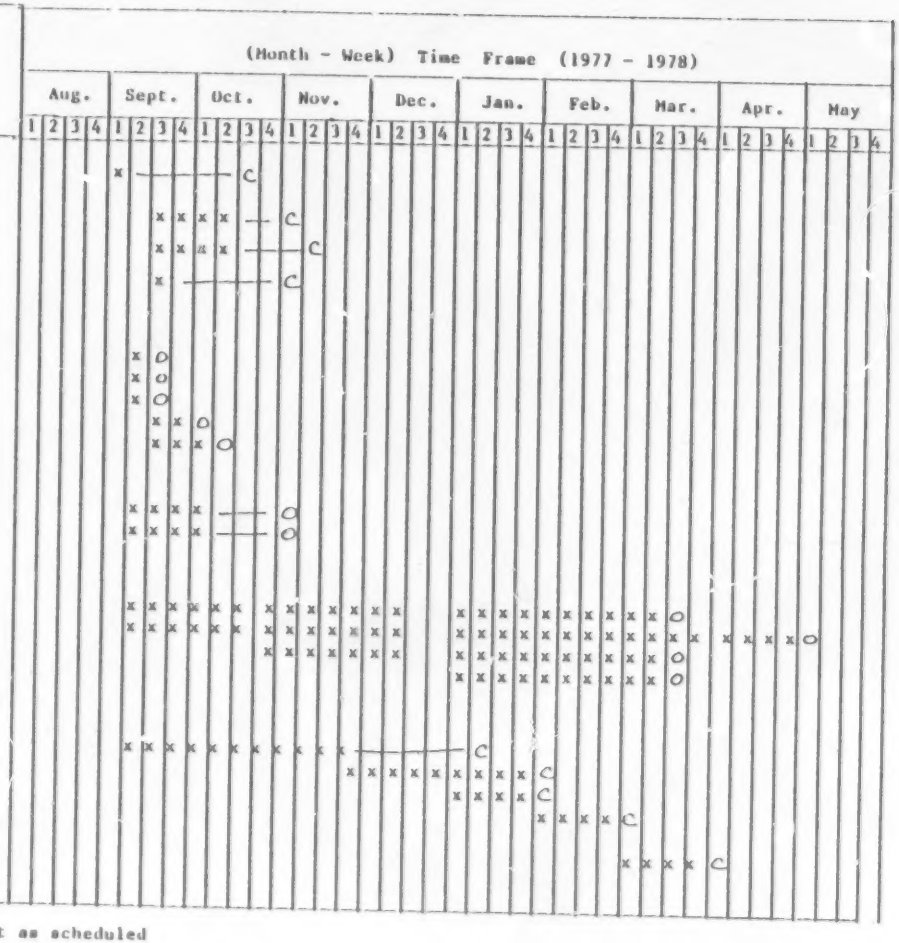
TABLE II-16
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION STRATEGIES
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE

TASKS	Responsibility of:	(Month - Week) Time Frame (1977 - 1978)
9. Develop Sampling Matrix	Research & Eval. Division	
a. Number of teachers		x x x - C
b. Number of students		x x x - C
c. Subject areas		x x x - C
10. Develop Pretests and Postests for Pilot Schools 2/	Pupil Appraisal	x x x x x x x → - C
a. Code and Label Objectives 3/	DRE/DAIS	x x x x x x x → C
11. Monthly Progress Review 4/	Research & Eval. Division	x x x x x C C
	Superintendent's Office	x x x x x C C
12. Review Curriculum Materials		
a. Verify that Behavior-Obj. fit Def.	Curriculum Writers	x x x x x x x x x x x x x C
b. Verify that Instruct. Act. agree with Behavior Objectives		x x x x x x x x x x x x x O
c. Verify that Assessment Tasks agree with Behavior Objectives	CBC Coord. Team	x x x x x x x x x x x x x O
d. Determine Reading Complexity Level (SMOG Test)		x x x x x x x x x x x x x x x x x x x x x x x x O
e. Determine Reading Emphasis Level		x x x x x x x x x x x x x O
f. Determine Power Levels of Triads		x x x x x x x x x x x x x x x x x x x x x x x x O
g. Check Hierarchy		x x x x x x x x x x x x x → O
13. Verification of Assessment Aspects of Curriculum Materials	Pupil Appraisal CBC Coord. Team	
a. Check validity of Assessment Task Items		x x x x x x x x x x x x x O
b. Include performance criteria in Behavior Obj. and in the Assessment Tasks		x x x x x x x x x x x x x O
c. Develop new Assessment Tasks as Needed		x x x x x x x x x x x x x x x x x x x

TABLE II-16
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION STRATEGIES
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE

TASKS	Responsibility of:	(Month - Week) Time Frame (1977 - 1978)
14. Prepare Data Collection Schedule	Research & Eval. Division	
15. Implement Sampling Matrix	Research & Eval. Division	
a. Teachers	CBC Coord. Team	
b. Students	Principals	
c. Subject Areas	Pilot Schools	
16. Conduct Briefings	Research & Eval. Division	
a. For CBC Coordinating Team		
b. For Central Administration		
c. For Division of Automated Info. Serv.		
d. For Regional Assistant Suptds.		
e. For Administrators and Staff of Pilot	Sch.	
17. Develop Data Processing Procedures and Report Requirements	Research & Eval. Division	
18. Collect Data	Div. of Automated Info. Serv.	
a. From CBC Coord. Team, Pupil Appraisal Teachers, Counselors	(a-d) Research & Eval. Division	
b. Maintain Quality Control	(c,d)	
c. Compile Data Obj. by Objective	Pupil Appraisal	
d. Tabulate Results		
19. Determine Reading Comp. Level (CLOZE) 5/		
a. Identify Items	(a,b)	
b. Develop Packages	CBC Coord. Team/Curr. Writers	
c. Develop Sampling Matrix for Pkg. Adm.	(b,c,e)	
d. Administer Packages	Research & Eval. Division	
e. Collect, Score and Analyze	(d)	
	Teachers, Pilot Schools	

(cont.)



KEY: O = Task completed and ongoing
C = Task Completed as scheduled
-C = Task completed, but not as scheduled
→ = Task incomplete; behind schedule

5/ Modified: Teachers were given training and the responsibility for determining reading comprehension level using the CLOZE procedure.

TABLE II-16
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION STRATEGIES
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE

TASKS	Responsibility of:	(Month - Week) Time Frame (1977 - 1978)
		Aug. 1 2 3 4 | Sept. 1 2 3 4 | Oct. 1 2 3 4 | Nov. 1 2 3 4 | Dec. 1 2 3 4 | Jan. 1 2 3 4 | Feb. 1 2 3 4 | Mar. 1 2 3 4 | Apr. 1 2 3 4 | May 1 2 3 4
20. Prepare CBC Supplemental Materials as needed	Pupil Appraisal CBC Coord. Team	
a. Reproduce Materials b. Disseminate Materials		
21. Conduct Staff Development	CBC Coord. Team	
22. Classroom Observation	Principals Pilot Schools or Designes	
23. Process Data 6/	Division of Automated Info.Serv.	
a. Compile Data Objective by Obj. b. Maintain Quality Control c. Compute Data d. Generate Printouts		
24. Determine the Reliability of Assessment Items 7/	Pupil Appraisal Div. of Automated Info. Serv.	
25. Provide Feedback	Research & Eval. Division	
a. To CBC Coordinating Team b. To Pilot Schools c. To Administration	CBC Coordinating Team	
26. Analyze Data 8/	Research & Eval. Division CBC Coordinating Team	
a. Curriculum Materials Rev. Data b. Puissance Index Data c. Sampling Data d. Reading Emphasis Data e. Reading Complexity Data f. Reading Comprehension Data g. Teacher Feedback Data h. Teacher Background Data (cont.)		

KEY: O = Task completed and ongoing −C = Task completed, but not as scheduled
C = Task Completed as scheduled —→ = Task incomplete; behind schedule

6/ Consultation with DAIS indicates resources are needed for storage, editing, and reporting
7/ Consultation with DAIS indicates availability of a statistical program to complete task. Data collected will be used.
8/ Procedures for 26a through f were modified, data for analysis will not be available. G through I (excluding i) and Tasks 27 through 29 are contingent upon the completion of Task number 23).

TABLE II-16
PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
CBC CURRICULUM VALIDATION STRATEGIES
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE

TASKS	Responsibility of:	(Month - Week) Time Frame (1977 - 1978)
		Aug. 1 2 3 4 | Sept. 1 2 3 4 | Oct. 1 2 3 4 | Nov. 1 2 3 4 | Dec. 1 2 3 4 | Jan. 1 2 3 4 | Feb. 1 2 3 4 | Mar. 1 2 3 4 | Apr. 1 2 3 4 | May 1 2 3 4
i. Observation Data		x x x x x x x x x x — — — →
j. Student Performance and Attendance Data		x x x x x x x x x x — — — →
k. Hypothesis of Learning Dependency Data		x x x x x x x x x x — — — →
l. Hierarchy Data		x x x x x x x x x x — — — →
27. Preliminary Draft		x x x x x x x x x x x x x →
28. Dissemination		x →
29. Report to Public		x
NOTE: Above validation schedule reflects the completed priority areas curriculum materials as of August 12, 1977.		
Strategies Prepared by Division of Research and Evaluation In Cooperation with the CBC Coordinating Team & Pupil Appraisal August 12, 1977 (Adjusted September 12, 1977)		

Key: O = Task completed and on-going — C = Task completed but not on schedule
C = Task completed as scheduled — → = Task incomplete; behind schedule

8/ Procedures for 26a through f were modified, data for analysis will not be available. g through l (excluding i) and Tasks 27 through 29 are contingent upon the completion of Task number 23.

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D. Summary

The design and development of strategies, procedures, and instruments required to conduct the test of CBC language arts/English and science curricula in 21 Pilot Schools during the 1977-78 school year were complex and time-consuming activities. As suggested by the description of these activities presented in this chapter, completion of the validation task required substantial commitment of time and resources by the Division of Research and Evaluation, as the organization responsible for the task, and by numerous other participants (the CBC Coordinating Team, the Pupil Appraisal Branch, the Division of Automated Information Services, teachers and principals in the Pilot Schools, consultants, etc.). That the task was completed with relatively few problems or delays emphasizes the fact that all persons involved in the validation were committed to the effort. Description and analysis of the results of the validation task is presented in Chapter III of this report, while implications and recommendations based on the validation results are presented in Chapter IV.

CHAPTER III. VALIDATION RESULTS

A. Introduction

The validation plan for the language arts/English and science curricula was organized into three phases: (1) prior to distributing the materials for tryout, (2) during tryout in the Pilot Schools, and (3) time of revision after tryout. Prior to trying out the materials a careful examination of format and organization was made. During the tryout or field test phase in the Pilot Schools, information was gathered on student acquisition of each behavioral objective, evidence of the CBC approach being applied, and teacher feedback and comments on the effectiveness of each objective. The revision phase will be based upon the identification of material in need of alteration or replacement as a result of the analysis of the data. Because of the nature of the CBC materials, four components are subject to alteration or replacement:

- Behavioral Objectives
- Instructional Activities
- Assessment Tasks
- Hypotheses of Learning Dependency

The validation results presented in this chapter are intended to provide the identification of the materials in need of revision or replacement.

B. Sample Size

Originally 29 schools were selected for the CBC validation study (see Table II-7, Chapter II, page 42). Due to the size of some of the elementary schools some could not accommodate the validation of the curriculum materials in all four subject matter areas. Three of the

elementary schools validated reading and mathematics curricula only, four elementary schools validated language arts/English and science curricula only, and one validated only the science curriculum materials (see Table II-10, Chapter II, page 47). The two senior high schools, the two career development centers, and the one special education school engaged in a special curriculum review effort conducted by the CBC Coordinating Team. As a result a total of 21 schools validated the language arts/English and science curricula during the school year 1977-78.

Table III-1 presents by curriculum area and by level the total number of schools, teachers, and students for which data have been collected, computerized, and analyzed in this report. The sample includes 2,884 different students (1297 in language arts/English and 1588 in science) and 137 teachers in 21 elementary and junior high schools.

C. Validation Monitoring

According to the validation design the principal (or a designee) of each Pilot School was to observe each validating teacher's classroom a minimum of four times between the period of 15 November 1977 to 15 March 1978. Due to the extensive observations being conducted by the regional offices and other offices, principals of some schools decided that the addition of four observations by them would be a hindrance to the normal flow of the instructional program. As a result there was an average of two observations of each validating teacher conducted by principals in the 21 schools validating language arts/English and science. The compilation of the data from the CBC Curriculum Validation Observation Form (see Table II-4) shows that CBC was being implemented in the designated classrooms. Across teachers and classrooms there were a total of 2,007 items checked on the Observation Form. Of these, 1,719 items were

TABLE III-1

NUMBER OF STUDENTS, TEACHERS, AND SCHOOLS BY GRADE LEVEL FOR LANGUAGE ARTS/ENGLISH AND SCIENCE VALIDATION

	Level							Level				
	1	2	3	4	5	6	Subtotal	7	8	9	Subtotal	Total
Language Arts/English												
Students	209	134	192	111	229	155	1,030	148	58	60	266	1,296
Teachers	11	8	10	6	11	8	54	8	2	5	15	69
Schools	10	7	10	6	11	8		7	2	5		
Science												
Students	247	260	193	201	178	211	1,290	298			298	1,588
Teachers	10	12	9	9	9	10	59	9			9	68
Schools	10	12	8	8	9	8		7				

Grand Total: Students 2,884 Teachers 137 Schools 21

checked as observed evidence of CBC implementation and 288 items were checked as not observed. The not observed figure may be somewhat inflated as some of the not observed items could more appropriately have been marked as "not applicable for this observation." All in all, this means that teachers were implementing the CBC approach in their classrooms.

To supplement the principal's monitoring data, staff from the Division of Research and Evaluation conducted on-site observations in each of the classrooms where the language arts/English and science curricula were being validated. Data collected supported the principal's monitoring data that showed, indeed, that the CBC approach and curriculum materials were being implemented. Further verification was elicited through the resulting data from the "CBC Curriculum Validation Strategies Monitoring Form" (Table II-15, page 64) completed by schools and offices responsible for the validation tasks.

D. Objectives Validated

In November 1977, teachers in the 21 Pilot Schools were given, along with the materials to be validated, a sequential listing of the objectives by strand and category to be validated for each grade level in language arts/English (Table III-2) and science (Table III-3). Teachers were told to pretest their students by using the assessment tasks for the objective(s) immediately preceding the first objective listed in sequence for their grade level. This assessment would enable them to identify those students in their class who were ready to begin instruction with the prescribed grade level objectives and, thus, be involved in the validation process, as the validation process was to include only those students having the appropriate entry level skills.

TABLE III-2

LANGUAGE ARTS/ENGLISH IDENTIFIED OBJECTIVES
IN SEQUENCE FOR VALIDATION LEVELS 1-6

CATEGORY	OBJECTIVE NUMBER	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
	FIRST GRADE		
Capitalization	1.1		18
	1.2		19
	1.3	3	23
Punctuation	2.1		38
	2.7	2	41
Sentence Structure	1.1 (Pre-test)		76
	1.2	2	77
	SECOND GRADE		
Capitalization	1.4		21
	1.5		25
	1.6	3	29
Punctuation	2.2		40
	2.3		42
	2.4		44
	2.5		46
	2.6	5	47a
Sentence Structure	1.3		78
	1.5		82
	1.6	3	86
	THIRD GRADE		
Capitalization	1.7		30
	1.8	2	31
Punctuation	2.9		48
	2.10		49
	2.11		50
	2.12	4	50a
Sentence Structure	1.1a		76a
	1.4		80
	1.7		87a
	1.11		89
	2.1	5	91

TABLE III-2 (continued)

CATEGORY	OBJECTIVE NUMBER	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
	FOURTH GRADE		
Capitalization	1.9		33
	1.10	2	34
Punctuation	2.8		43
	2.13		43a
	2.14		53
	2.15		63
	2.16		65a
	2.18a		67a
	2.17		67
	2.18	8	68
Sentence Structure	1.8		88b
	1.9		88a
	1.10		88c
	2.2		92
	2.3		93
	2.4		95
	2.5		97
	2.6		98
	2.7		99
	1.0		75a
	2.0	11	89a
	FIFTH GRADE		
Capitalization	1.11		35
	1.12		36
	1.13		37
	1.0	4	72-73
Punctuation	2.19		71
	2.20		55
	2.21		56
	2.22	4	58
	SIXTH GRADE		
Punctuation	2.23		69
	2.24		70
	2.25		59
	2.26		61
	2.27		66
	2.0	6	74
Letters/Forms	3.1		101
	3.2		103
	3.3		105
	3.4		106
	1.0		99a
	3.0	6	105a
		70	

TABLE III-2 (continued)

CATEGORY	OBJECTIVE NUMBER	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
	SEVENTH GRADE		
P.O. Speech	1		25-6
	2		27
	3		28
	4		29
	5		30-31
	6a		33
	6b	7	32
Capitalization	5		53
	8		60-61
	9	3	62-64
Punctuation	1		66-68
	2		69-71
	3	3	101
Plurals	4		110-111
	5		112-113
	6		114-115
	7		116-117
	8	5	118-119
Spelling	1		126
	2		129-130
	3	3	131
Verb Usage	1		153-154
	2		155
	3	3	156
Subject-Verb Agreement	1	1	167-168
Pronoun case	1		192
	2		193-194
	3		195
	4	4	199-200
Sentence Structure	Entry Objective		(Entry Objective) 276-278
	1		279
	2		280
	3		281
	4		282
	5		283
	6		284
	7	8	285-286

TABLE III-2 (continued)

CATEGORY	OBJECTIVE NUMBER	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
Paragraphs	1		289
	2		290-292
	3		293
	4		293a
	5		294
	6		295-297
	7		298-299
	8		300-302
	9	9	303-304
Compositions	1		333-334
	2		335
	3		336-337
	4		338
	5		339
	6		340
	7		341-342
	8	8	343
Forms	2	1	362b
Letters	1		374
	2		375
	3		376
	4		377
	5	5	378

TABLE III-2 (continued)

CATEGORY	OBJECTIVE NUMBERS	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
	EIGHTH GRADE		
Parts of Speech	7		34-35
	8		36-37
	9		38-39
	10		40-41
	11		42
	12	6	43-46
Punctuation	4		72-73
	5		74-78
	6		79-80
	7		81-84
	8	5	85-86
Plurals	9		120-121
	10	2	122-124
Spelling	4		132
	5	2	133-134
Subject-Verb Agreement	2		169-170
	3		171-172
	4		173
	5		174-175
	6		176-177
	7	6	178-179
Pronoun Case	5		196
	6	2	197-198
Sentence Structure	8		218-219
	9		220-222
	10	3	223-224

TABLE III-2 (continued)

CATEGORY	OBJECTIVE NUMBERS	TOTAL NUMBER OF OBJECTIVES	PAGE NUMBERS
	NINTH GRADE		
Punctuation	9		90
	10		87
	11	3	102
Spelling	6		135-136
	7		137-139
	8		140-141b
	9	4	142-143
Pronoun Case	7	1	201-202
Sentence Structure	11		225-227
	12		228-229
	13		230-233
	14		234-235
	15		236-238
	16		239-240
	17	7	241-243
Paragraphs	10		305-306
Advanced 1	11		307
	12		308
	13		309
	14	5	310-311
Forms	3		366-367e
	4		370
	5		369
	6		368
	7	5	371-372
		111	

TABLE III-3
SCIENCE IDENTIFIED OBJECTIVES
IN SEQUENCE FOR VALIDATION LEVELS 1-6

Strand	Category	Grade Level	Objective Number	Total Objectives
Observing		1	1 through 23 (#18 eliminated)	22
		2	24 through 34	11
		3	35 through 41	7
		4	42 through 47	6
		5	48 through 61	14
		6	62 through 64	3
				63

TABLE III-3 (continued)

Strand	Category	Grade Level	Objective Number	Total Objectives
	Science and Superstition	7	1 through 10	10
	Laboratory Techniques	7	11 through 31	21
	Matter	7	32 through 58	27
				58

A brief description of each of the language arts/English and science objectives is presented in Tables B-1 through B-11 and Tables B-12 through B-18, respectively, in Appendix B.

The procedures followed for processing the data are explained below:

1. Coding of Objectives. The numbering of objectives by the curriculum writers across strands, categories, and subject areas was not consistent. A coding system for objectives was developed by the Division of Automated Information Services in cooperation with the Division of Research and Evaluation that is uniform in nature and allows for immediate identification of subject area, level, strand, objective number, and category. The coding system is very flexible in that it allows for objectives to be deleted and objectives to be added without interrupting the coding system. An explanation of the eleven-digit, six-part objective code is presented in Table III-4.

2. The Computer Process. The Division of Automated Information Services was responsible for developing computer programs for analyzing the data collected on the Hypothesis of Learning Dependency Form (Table III-5), the Student Participation Form (Table II-6), and the Teacher Feedback Form (Table II-5). The computer process began with building HLD, student participation, and teacher feedback files and feeding these files into appropriate computer programs designed to organize and summarize the data for analysis. Figure III-1 displays the computer process schematically. Figures III-2, III-3, and III-4 are further breakdowns of the total computer process.

E. The Learning Hierarchies

The instructional triads (one behavioral objective, two instructional activities and three assessment tasks) for each strand

TABLE III-4

CODING SYSTEM FOR CBC MATERIALS

1. Curriculum Code

   a. consists of two alpha characters
      EX: EN - English

2. Grade or Level Designator

   a. one alpha character - fixed
      EX: E - Elementary
          S - Secondary

3. Strand Code

   a. one alpha character to represent the curriculum strand
      EX: W - writing strand within the English curriculum .

4. Objective Designator

   a. three digit fixed numbers
   b. ranges from 000 - 999
   c. identifies objective within content within a strand or category
      EX: 010 - objective number 10

5. Expansion Designator

   a. one numerical digit
   b. expansion or revision indicator
      EX: 0 - no revisions or expansions indicated

6. Category Area Code

   a. three alpha characters
   b. identifies content area within a strand
      EX: POS - Parts of Speech

TABLE III-5

CBC CURRICULUM VALIDATION
FOR LANGUAGE ARTS/ENGLISH AND SCIENCE
SCHOOL YEAR 1977-78

HYPOTHESIS OF LEARNING DEPENDENCY FORM

LANGUAGE ARTS ☐☐ DATE ☐☐☐☐☐☐

ENGLISH ☐☐ GRADE LEVEL ☐☐

SCIENCE ☐☐

1. OBJECTIVE CODE ☐☐☐☐☐☐☐☐☐☐☐☐

2. NEXT INSTRUCTIONAL OBJECTIVE CODE ☐☐☐☐☐☐☐☐☐☐☐☐

3. NUMBER OF IMMEDIATE TERMINAL OBJECTIVES ☐☐

4. NUMBER OF IMMEDIATE SUBORDINATE OBJECTIVES ☐☐

5. IMMEDIATE TERMINAL OBJECTIVE CODES

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6. IMMEDIATE SUBORDINATE OBJECTIVE CODES

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FIGURE III-1

COMPETENCY-BASED CURRICULUM VALIDATION SYSTEM

DESIGN SCHEMATIC

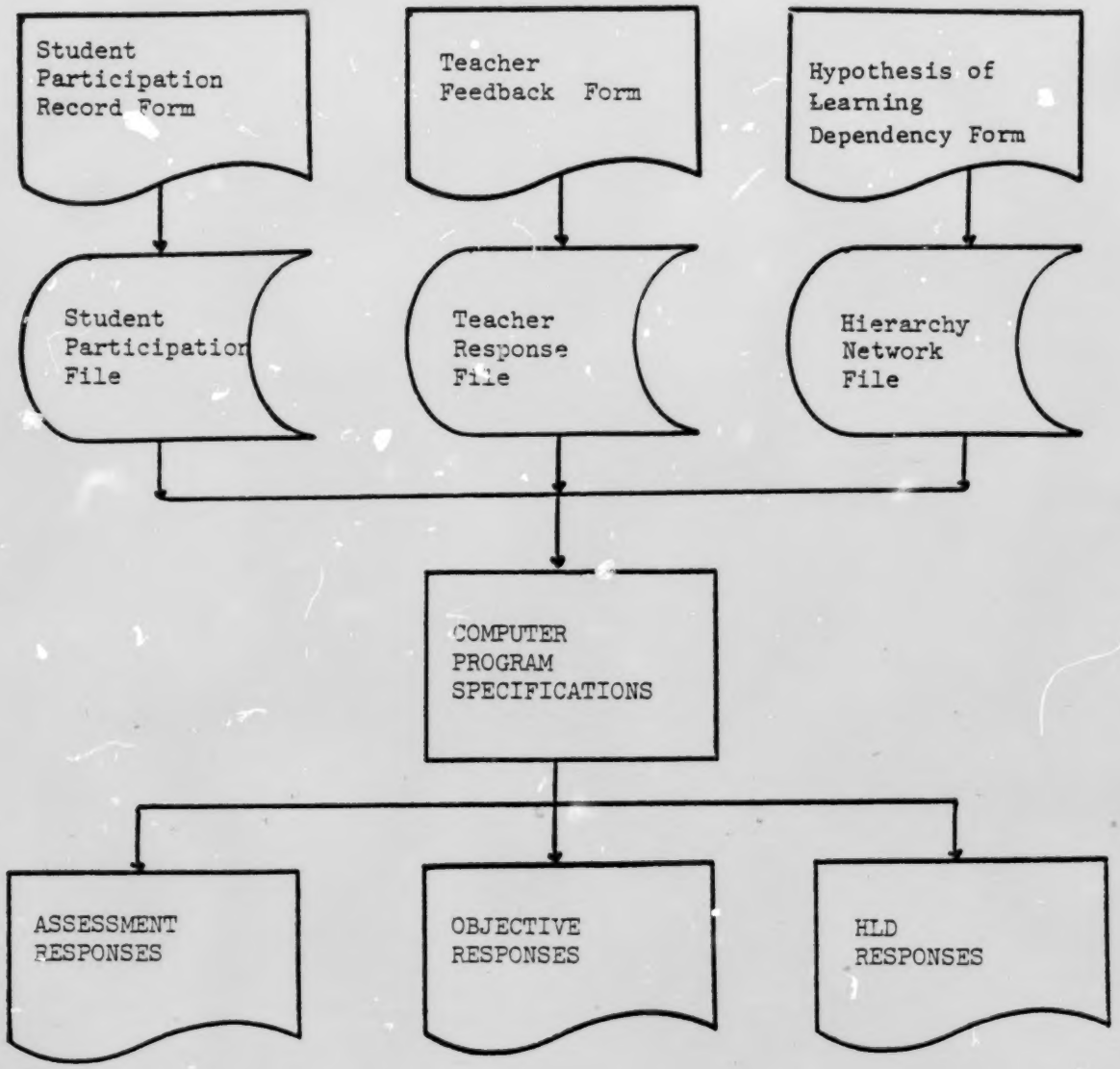


FIGURE III-2

COMPETENCY-BASED CURRICULUM VALIDATION SYSTEM

STUDENT DATA PROCESSING MODULE

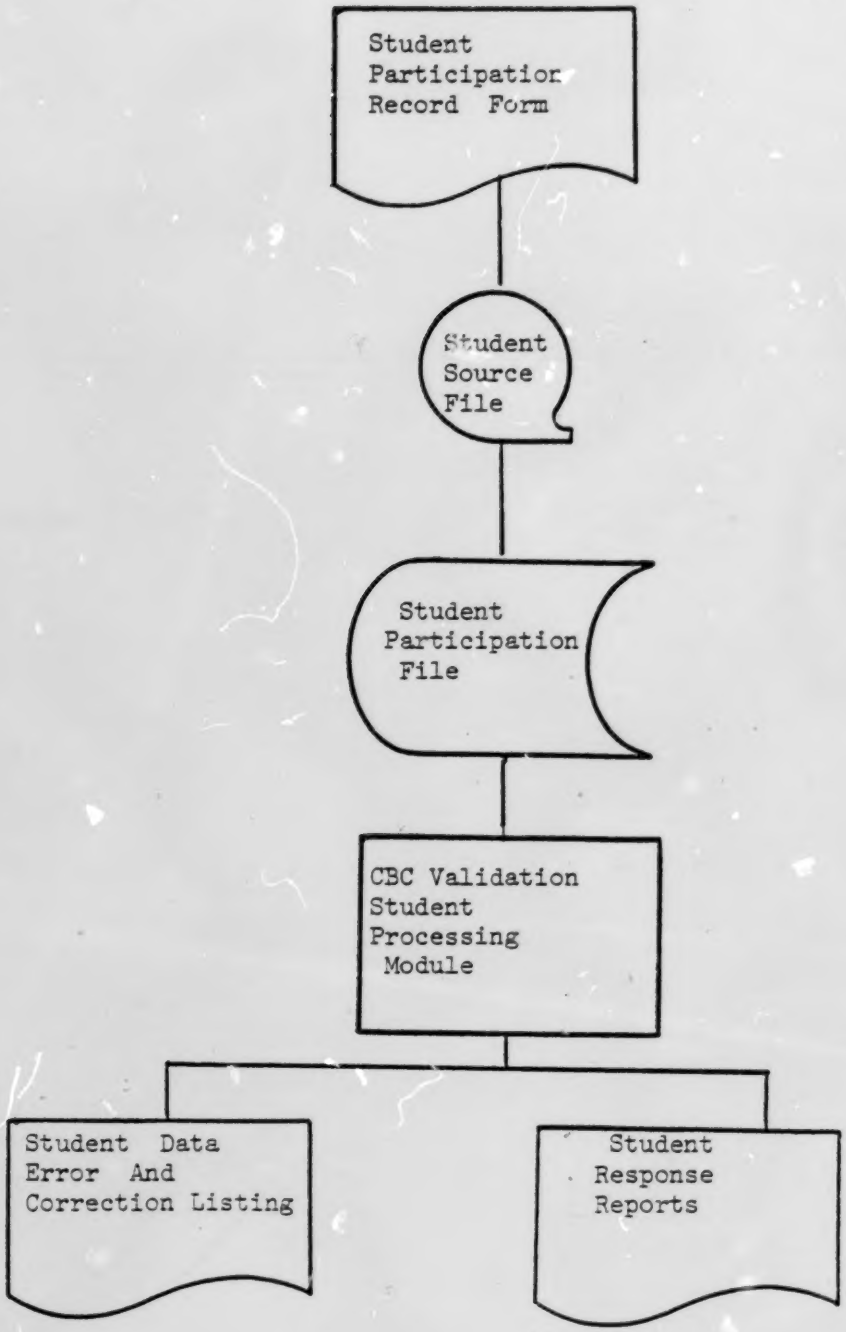

Student Participation Record Form
Student Source File
Student Participation File
CBC Validation Student Processing Module
Student Data Error And Correction Listing
Student Response Reports

FIGURE III-3

COMPETENCY-BASED CURRICULUM VALIDATION SYSTEM

TEACHER FEEDBACK PROCESSING MODULE

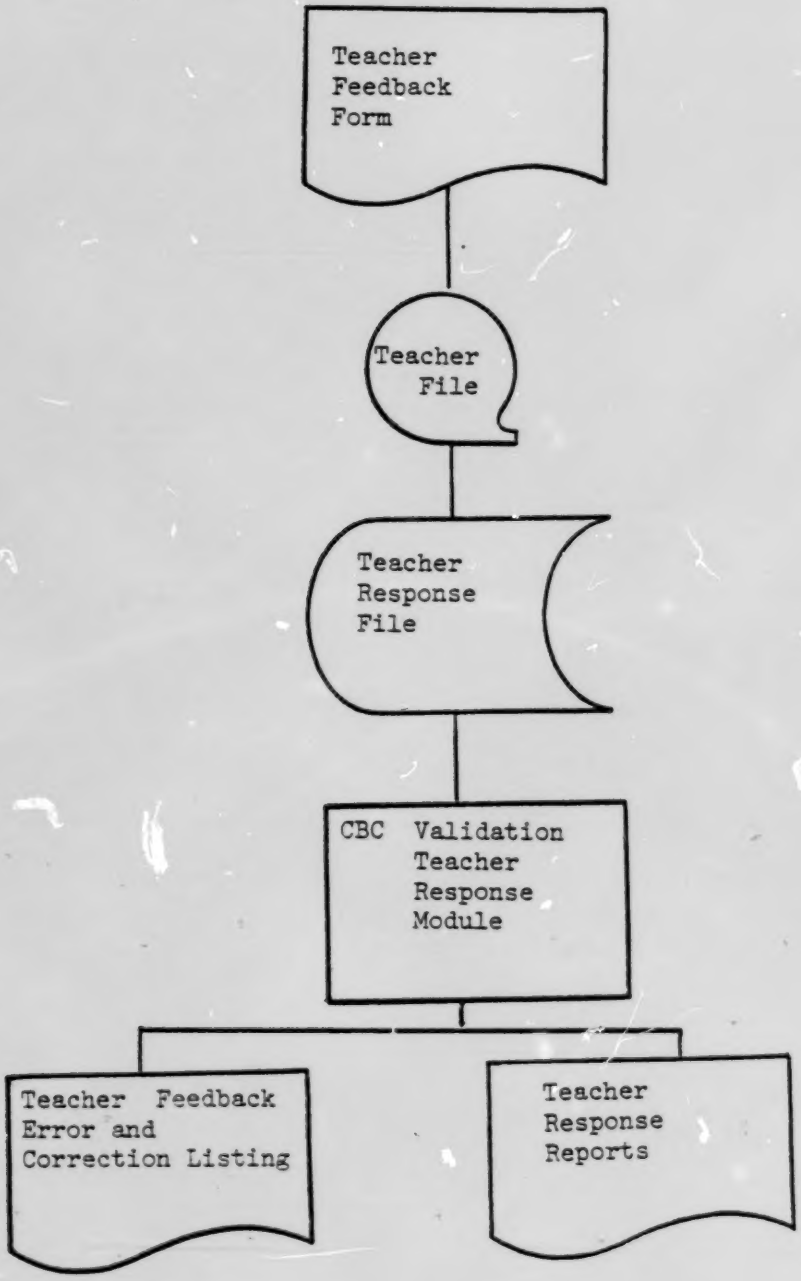
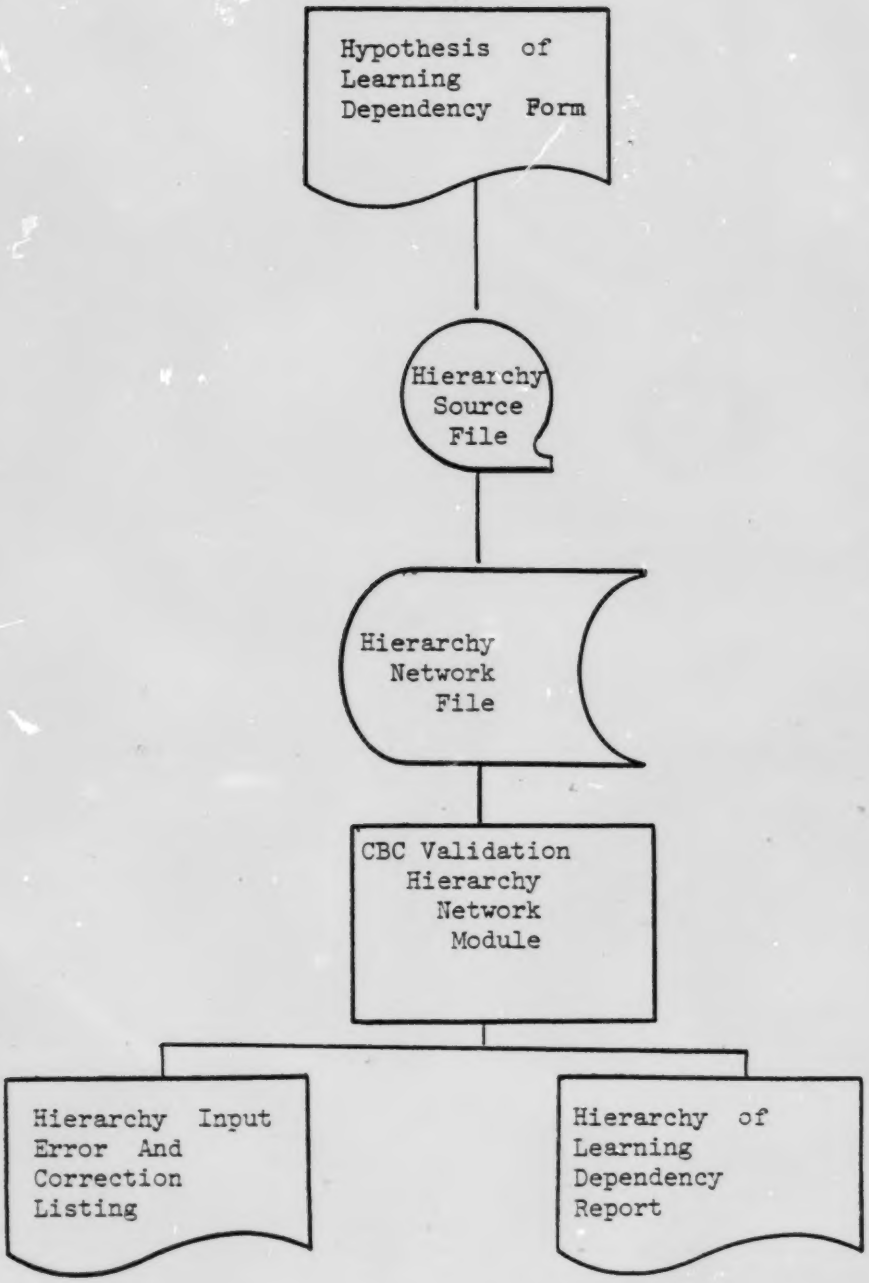


FIGURE III-4

COMPETENCY-BASED CURRICULUM VALIDATION SYSTEM

HIERARCHY NETWORK PROCESSING MODULE


Hypothesis of Learning Dependency Form
Hierarchy Source File
Hierarchy Network File
CBC Validation Hierarchy Network Module
Hierarchy Input Error And Correction Listing
Hierarchy of Learning Dependency Report

or category within a curriculum area have been sequentially arranged from simple to complex to form learning hierarchies. The learning hierarchy begins with the entry level objective(s) and moves upward to the terminal objective(s). Tables III-6 through III-17 present the learning hierarchies for language arts/English for the writing strand by category and levels. Also shown in each table are:

- The original numbering of the objective (inside the circles or squares);
- The new code for each objective in the hierarchy;
- The number of students who attempted the objective during validation; and
- The percent of students who mastered the objective, by successfully completing all three assessment tasks.

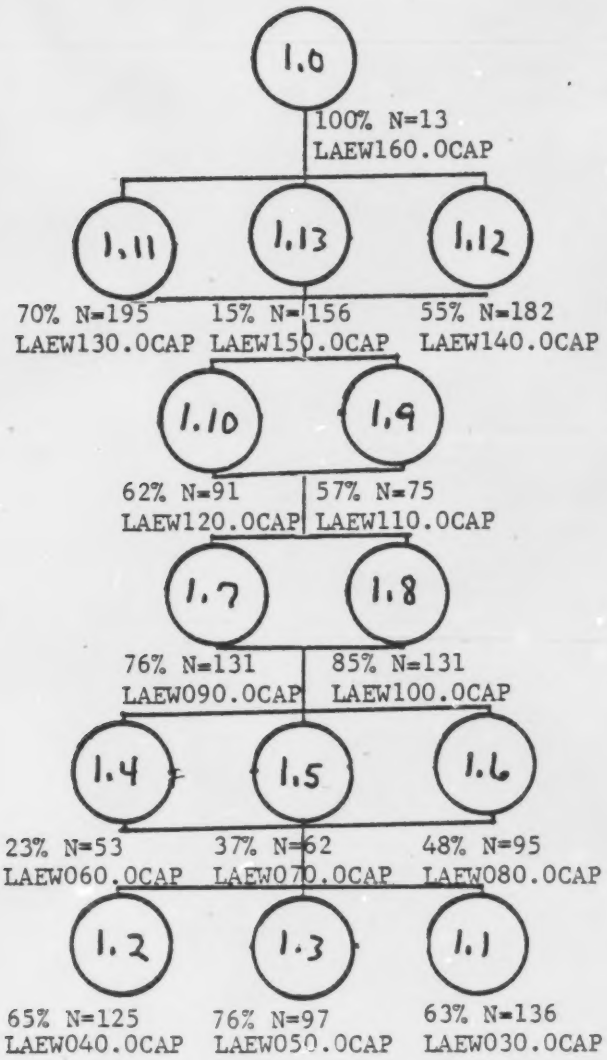
The same information is shown for science in Tables III-18 through III-26. Each hierarchy is organized into units of dependency called hypotheses of learning dependency, or HLD's. The principle applied to the design of every HLD is that the immediate subordinate objectives must be mastered before the terminal objective can be mastered.

F. Analysis of the Instructional Triads

There are at least two choices in constructing a data analysis for each learning hierarchy in the language arts/English and science materials. An analysis could be mounted, triad by triad (i.e., competency by competency), followed by examination of each hypothesis of learning dependency (HLD). A second choice is to examine the validity of each hypothesis of learning dependency first, and then focus down upon the instructional triads. The second method is adopted for this discussion since there is a useful economy in it that is not present in the first strategy. In the hierarchy analysis, one or more unneeded behavioral objectives may be identified. The appropriate decision for

TABLE III-6

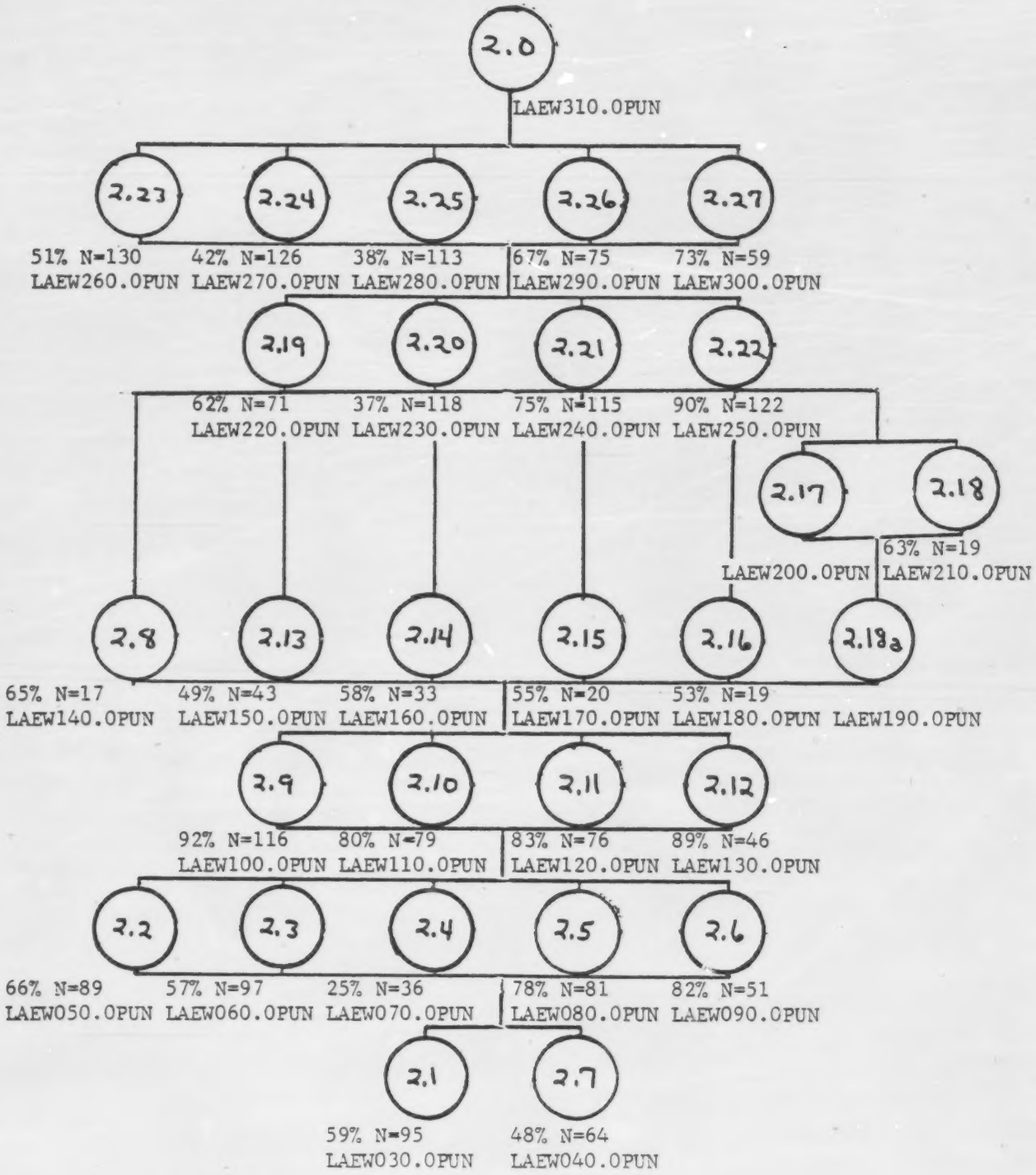
HIERARCHY FOR WRITING
CAPITALIZATION LEVELS 1-6



LANGUAGE ARTS/ENGLISH

TABLE III-7

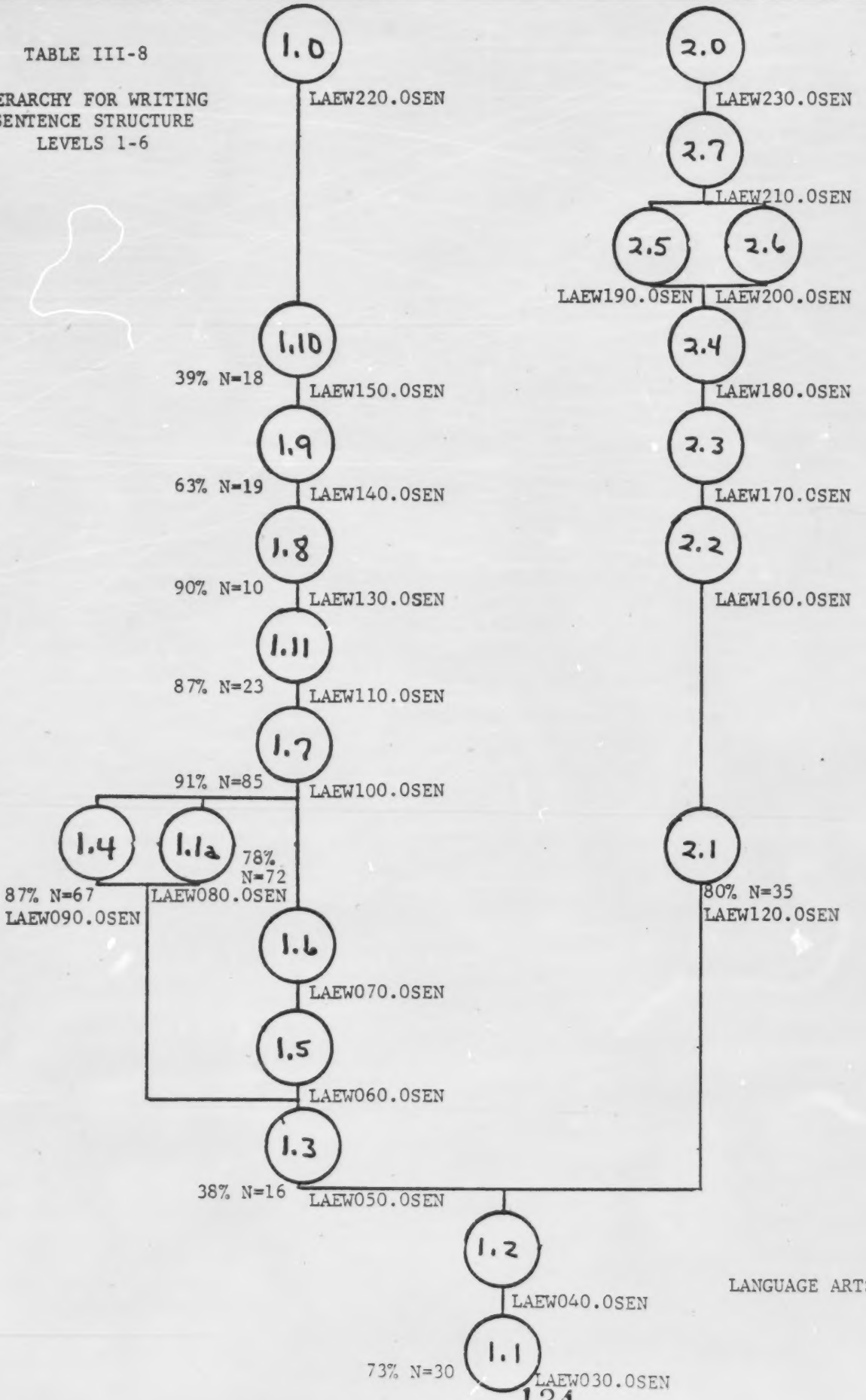
HIERARCHY FOR WRITING
PUNCTUATION LEVELS 1-6



LANGUAGE ARTS/ENGLISH

TABLE III-8

HIERARCHY FOR WRITING SENTENCE STRUCTURE LEVELS 1-6



LANGUAGE ARTS/ENGLISH

TABLE III-9

HIERARCHY FOR WRITING
LETTERS AND FORMS LEVEL 6

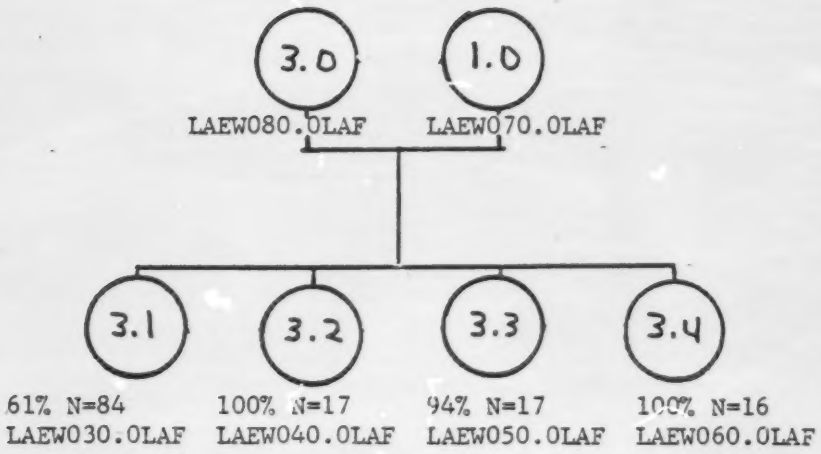


TABLE III-10

HIERARCHY FOR WRITING
PARTS OF SPEECH LEVELS 7-8

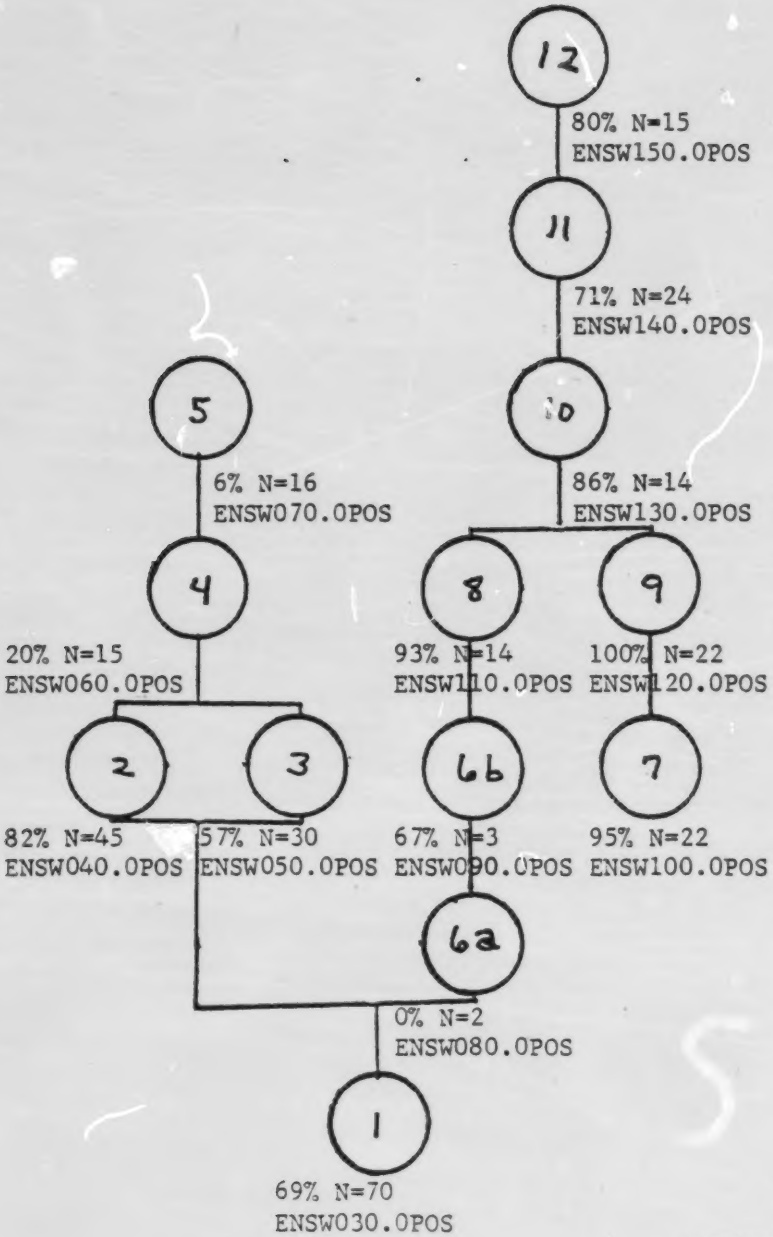
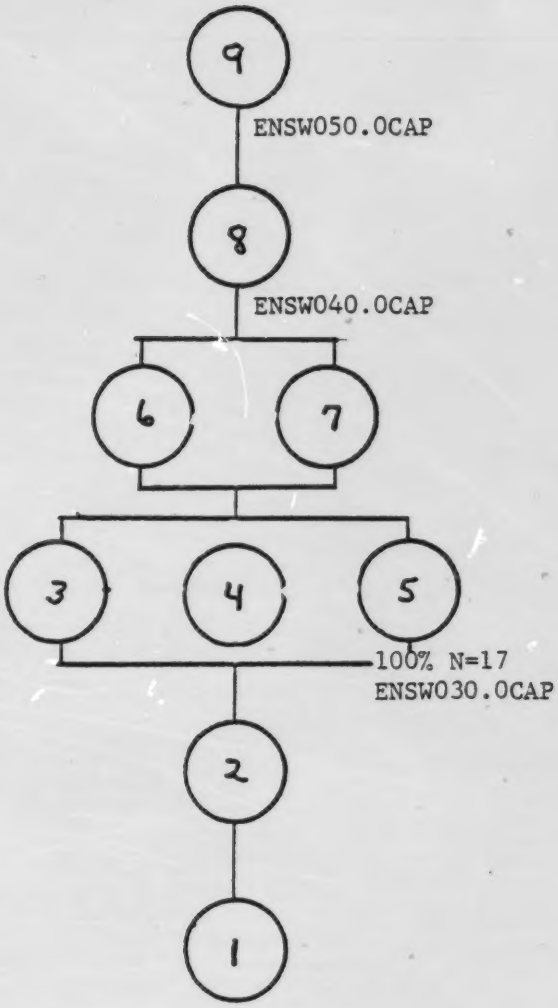


TABLE III-11

HIERARCHY FOR WRITING
CAPITALIZATION LEVEL 7

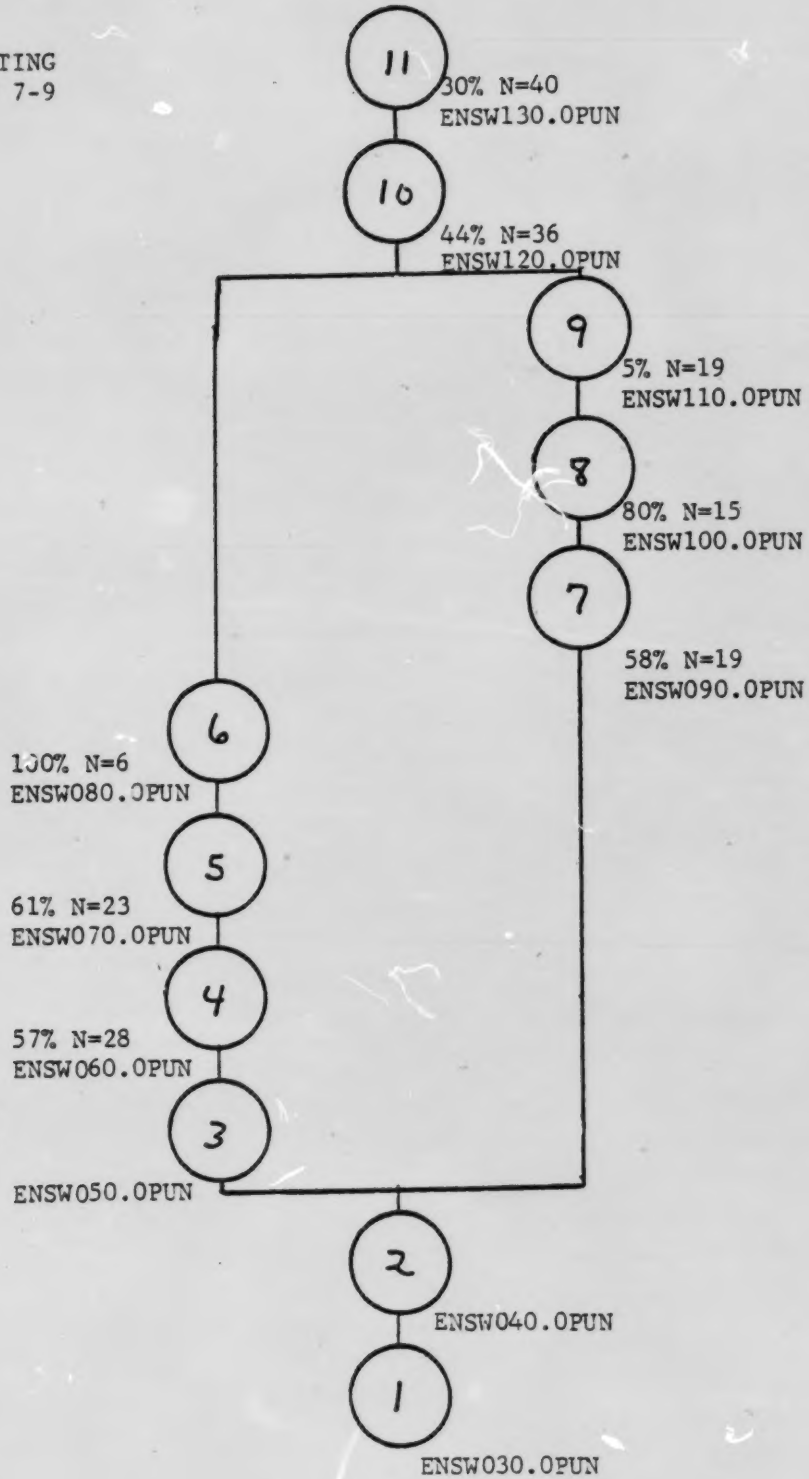


LANGUAGE ARTS/ENGLISH

*Unmarked circles are review and develop objectives and were not included in the materials to be validated.

TABLE III-12

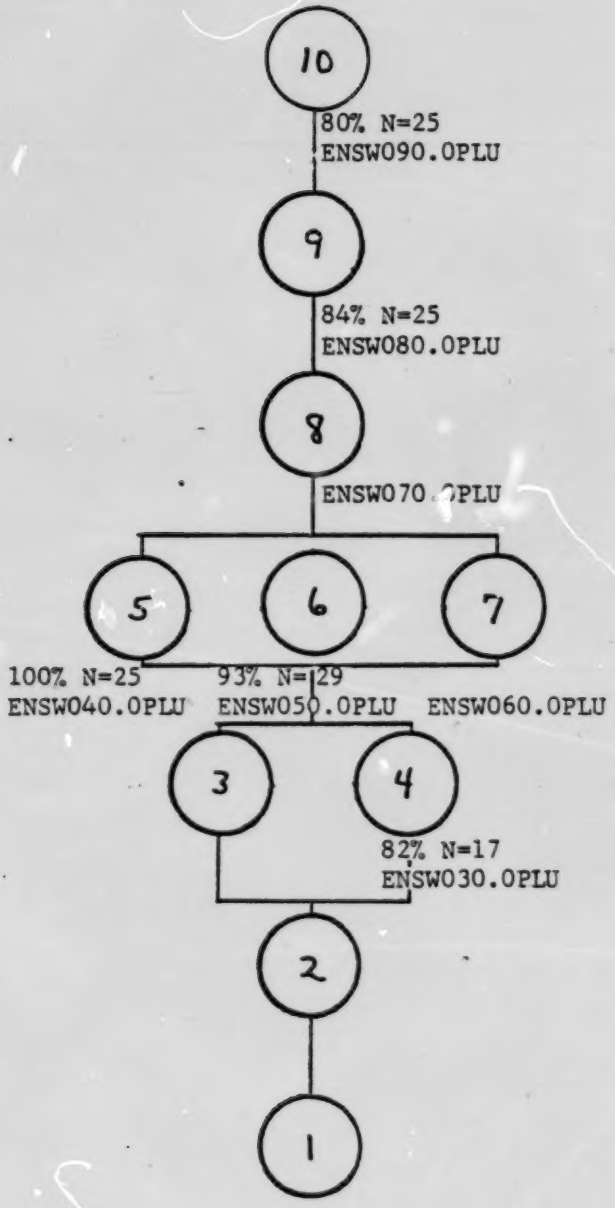
HIERARCHY FOR WRITING PUNCTUATION LEVELS 7-9



LANGUAGE ARTS/ENGLISH

TABLE III-13

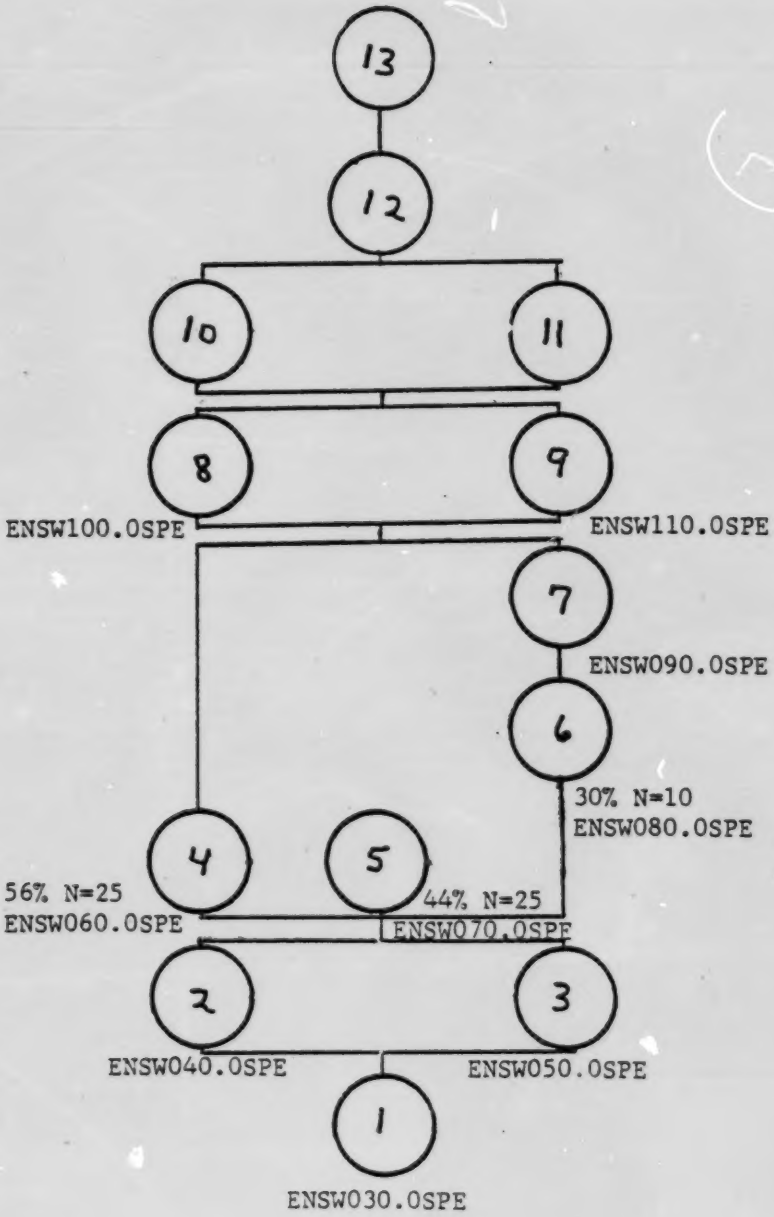
HIERARCHY FOR WRITING
PLURALS LEVELS 7-8



LANGUAGE ARTS/ENGLISH
*Objectives 1-3 were not included in the materials to be validated.

TABLE III-14

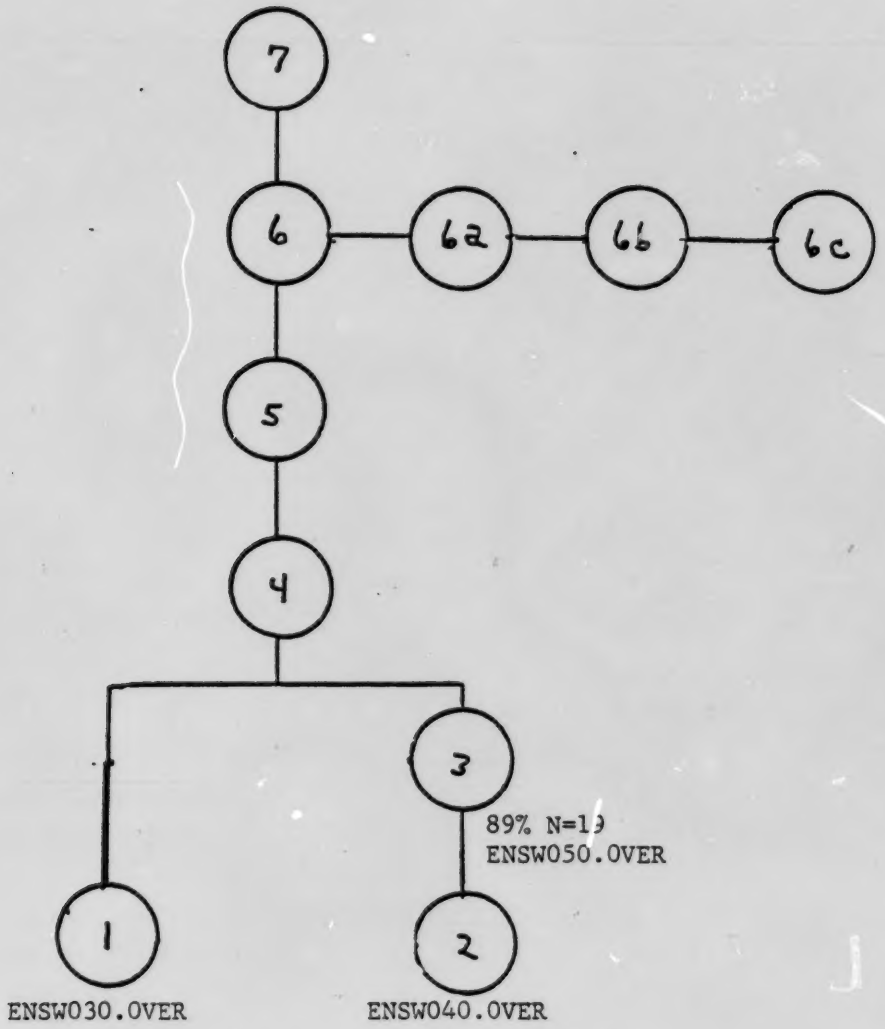
HIERARCHY FOR WRITING
SPELLING LEVELS 7-9



LANGUAGE ARTS/ENGLISH
*Objectives 10-13 were not included in the materials to be validated.

TABLE III-15

HIERARCHY FOR WRITING
VERB USAGE LEVEL 7



LANGUAGE ARTS/ENGLISH
*Objectives 4-7 were not included in the materials to be validated.

TABLE III-16

HIERARCHY FOR WRITING
PRONOUN CASE LEVELS 7-9

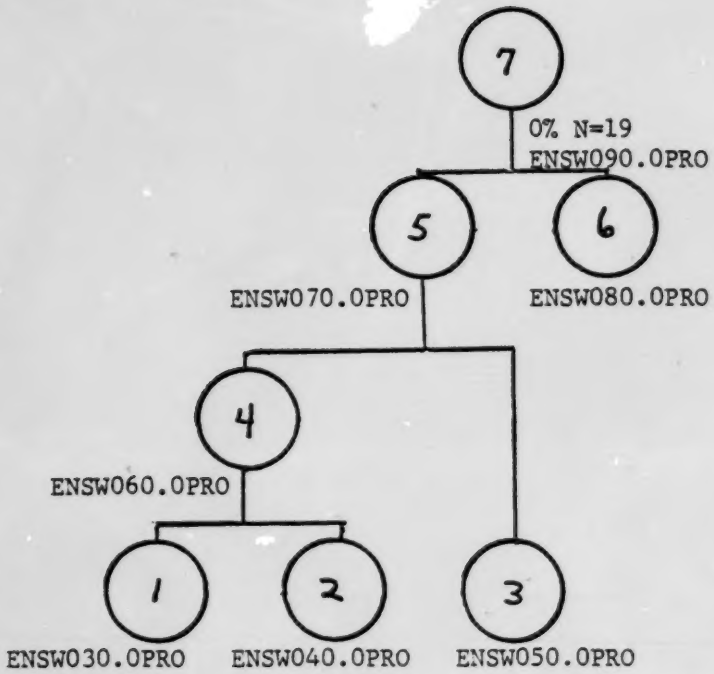


TABLE III-17

HIERARCHY FOR WRITING
SENTENCE STRUCTURE LEVELS 8-9

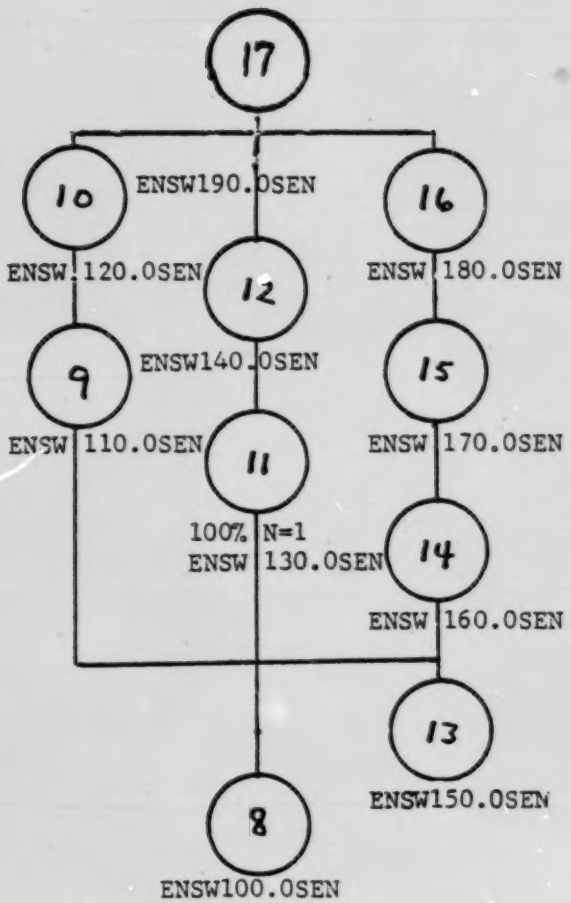


TABLE III-18

HIERARCHY FOR OBSERVING
LEVEL 1

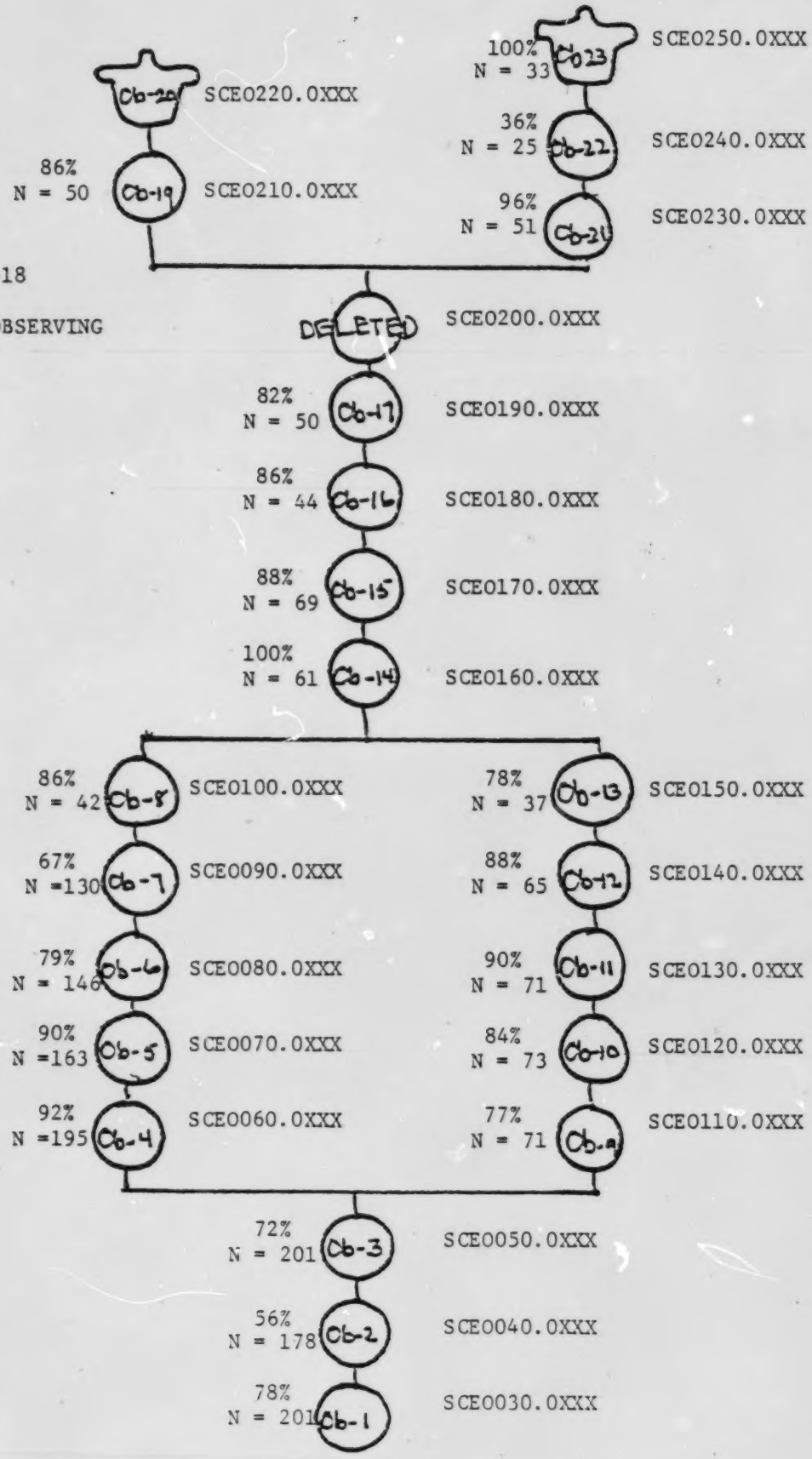


TABLE III-19

HIERARCHY FOR OBSERVING
LEVEL 2

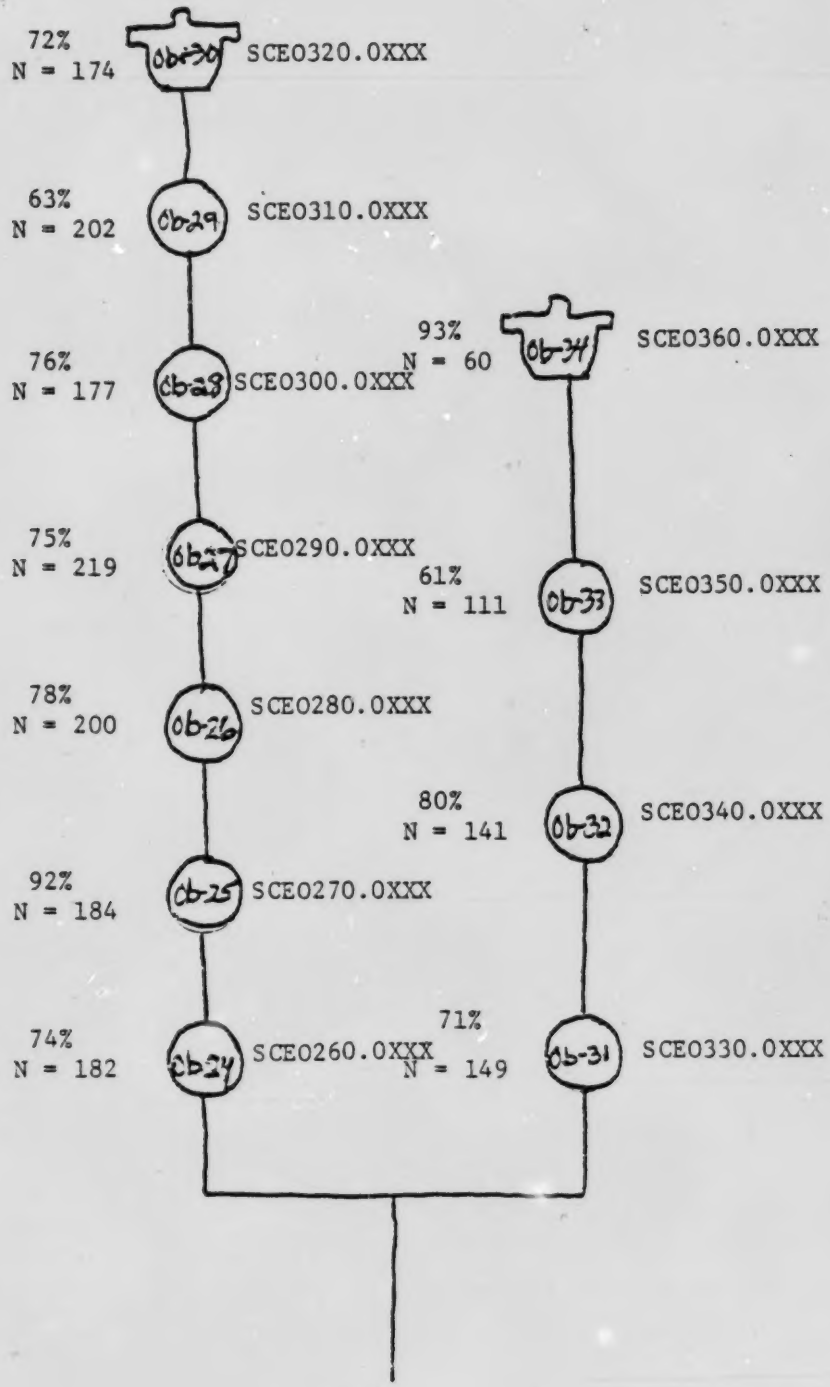


TABLE III-20

HIERARCHY FOR OBSERVING
LEVEL 3

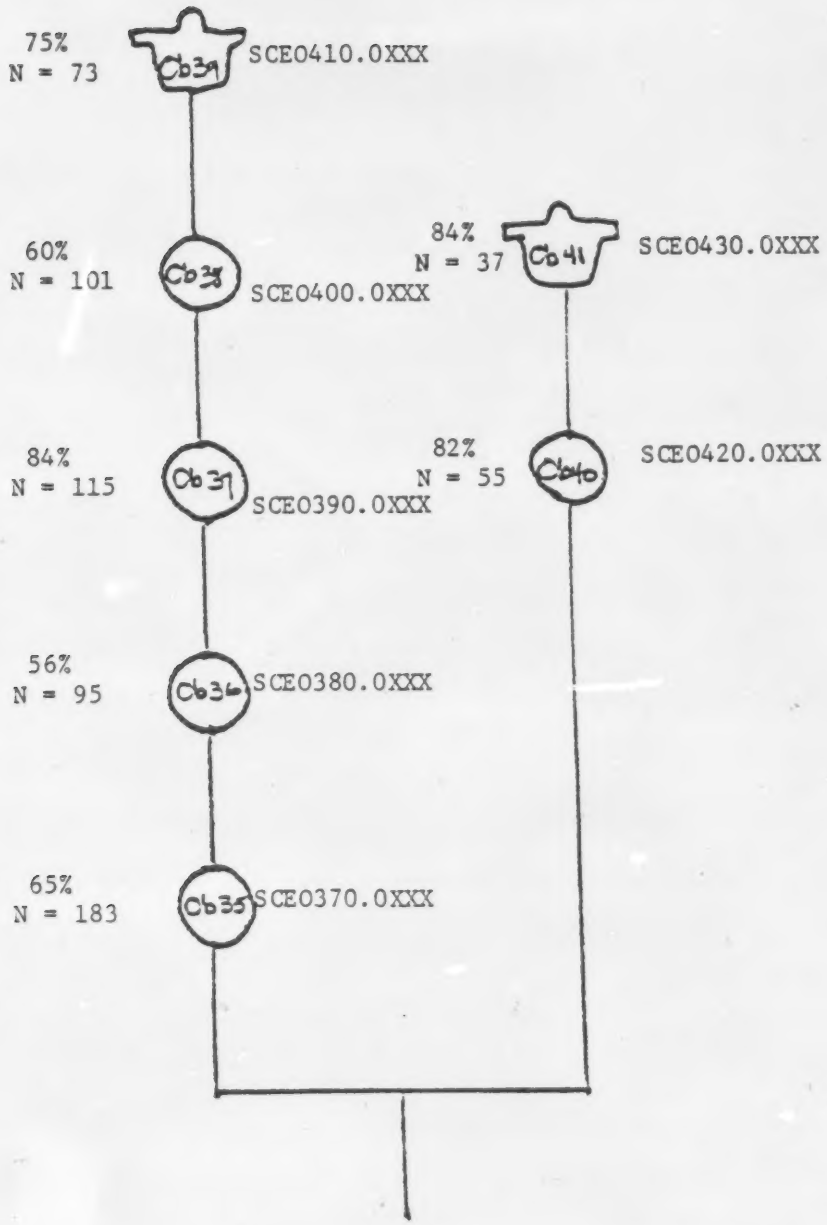


TABLE III-21

HIERARCHY FOR OBSERVING
LEVEL 4

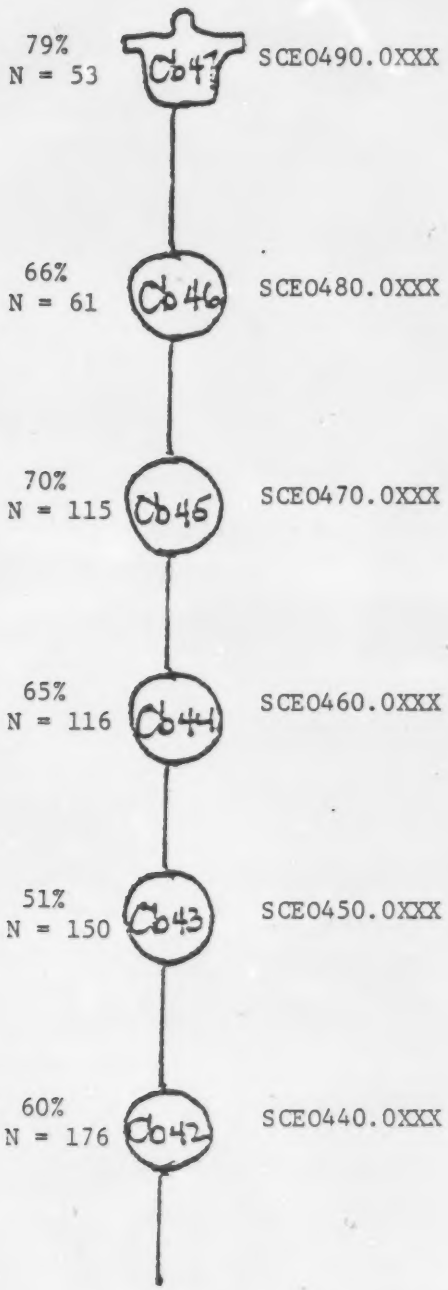


TABLE III-22

HIERARCHY FOR OBSERVING
LEVEL 5

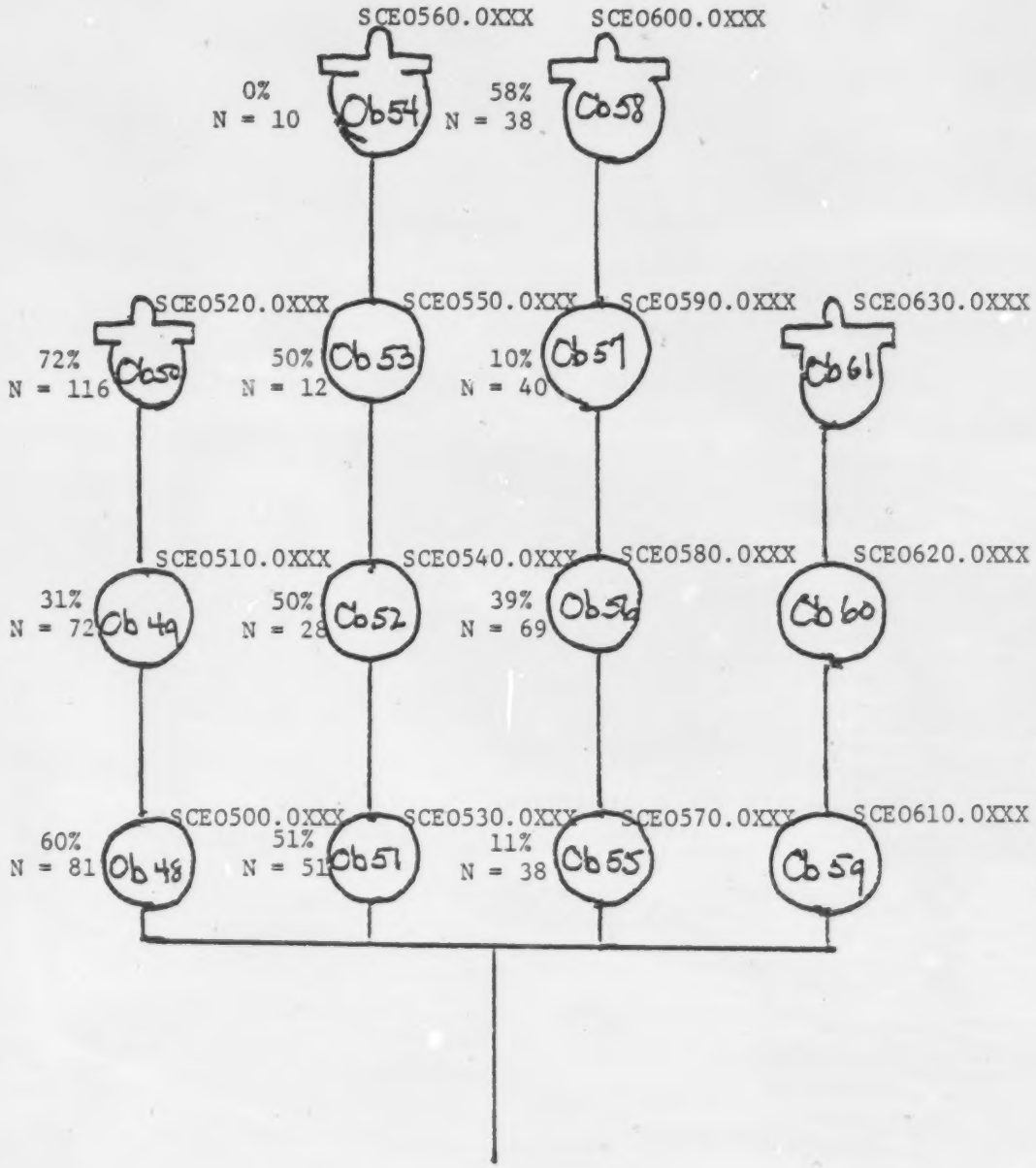


TABLE III-23

HIERARCHY FOR OBSERVING
LEVEL 6

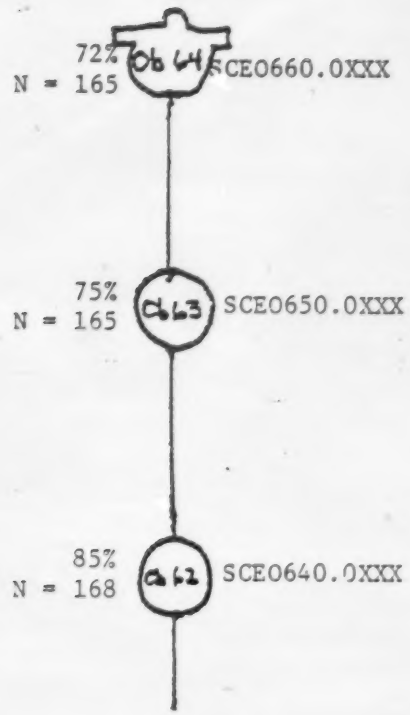


TABLE III-24

SCIENCE AND SUPERSTITION
LEARNING HIERARCHY
LEVEL 7

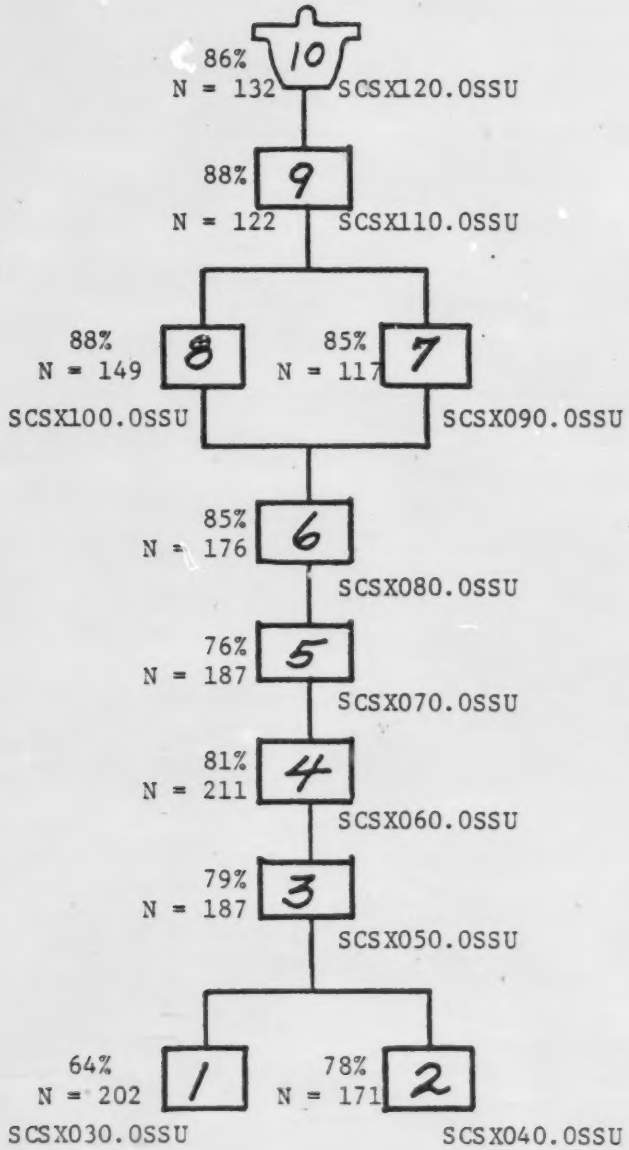


TABLE III-25

LABORATORY TECHNIQUES
LEARNING HIERARCHY
LEVEL 7

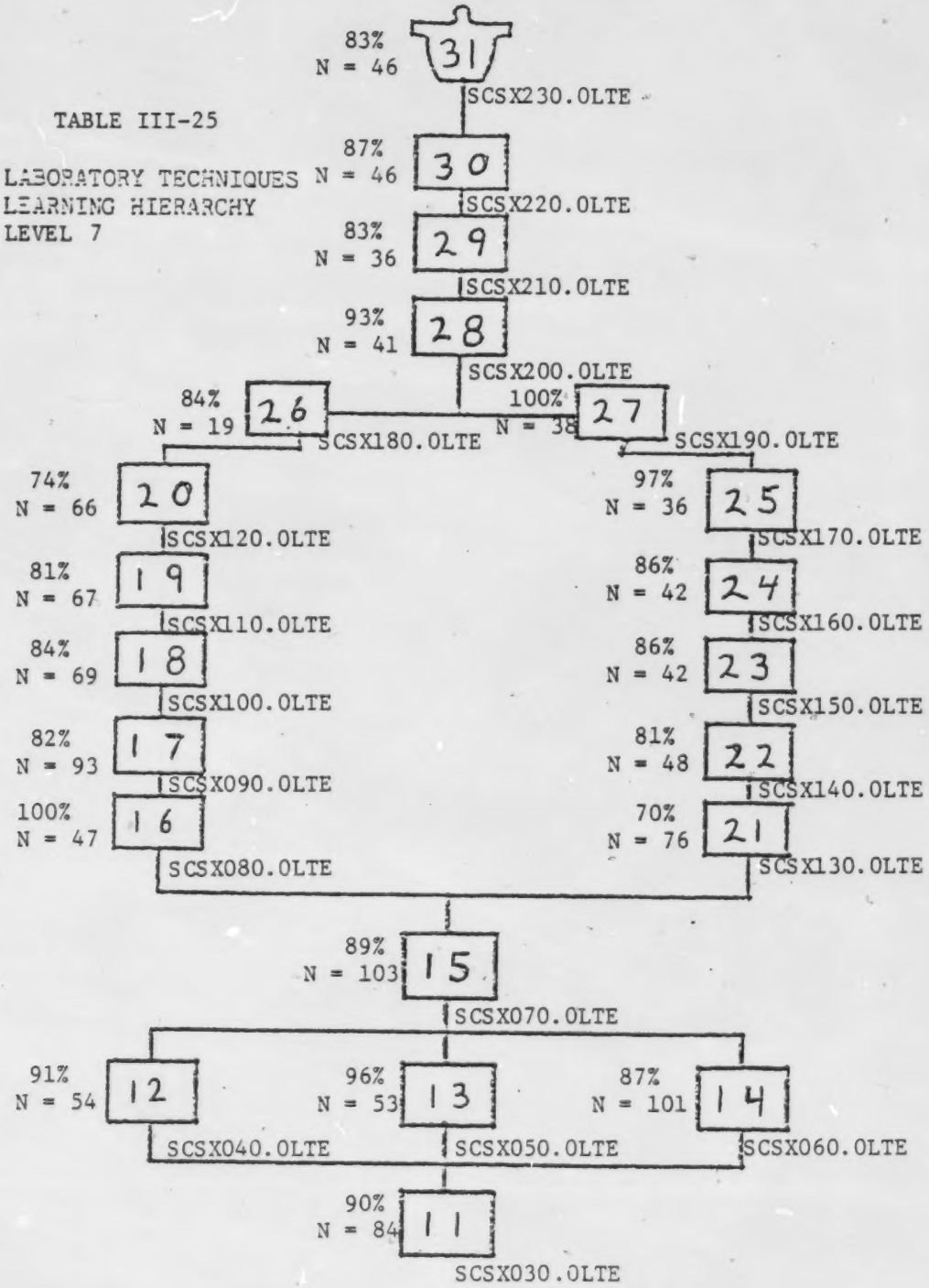
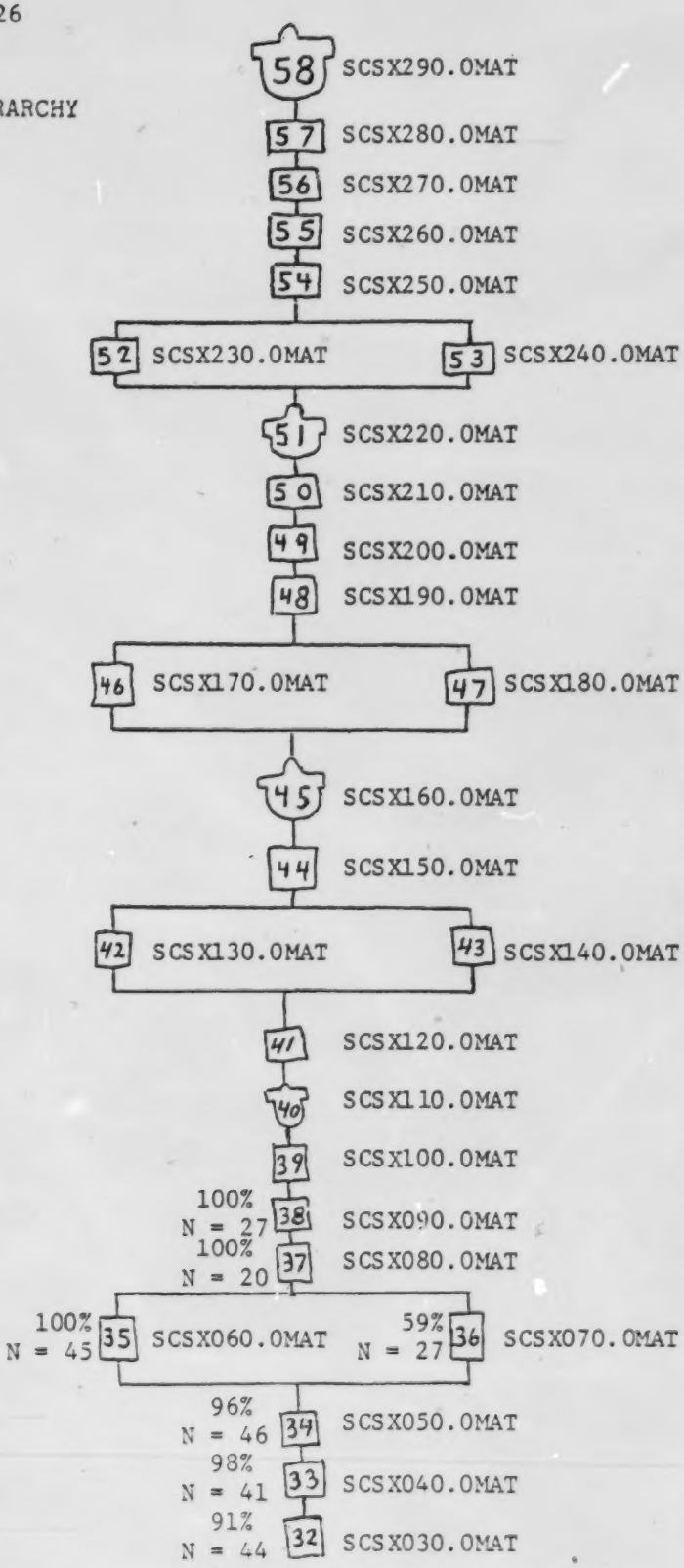


TABLE III-26

MATTER
LEARNING HIERARCHY
LEVEL 7



treating an unneeded behavioral objective is to eliminate that behavioral objective and its associated instructional triad from the CBC instructional program. This is the tactic whether the instructional triad individually is successful or not. The prime objective for each learning hierarchy is to assist all students in the acquisition of the terminal objective(s) of the hierarchy in the most efficient manner possible. The economy of the HLD analysis is achieved by not wasting time analyzing an instructional triad which has been established as unneeded in the learning sequence.

Because the fundamental organizing element of each learning hierarchy is the hypothesis of learning depndency, the HLD results are examined first starting from the entry level and working up to the terminal objective(s). Three relationships are examined for each HLD: adequacy, consistency, and completeness. The adequacy relationship ratio assesses the correctness of the inference, "If a learner possesses all of the immediate subordinate behaviors of the HLD and has been given two complete instructional activities designed to aid the learner in the acquisition of the terminal behavior of the HLD, then the learner will possess the terminal behavior of the HLD."[1] The consistency relationship ratio assesses the correctness of the inference, "If a learner possesses the terminal behavior of the HLD, then the learner possesses all of the immediate subordinate behaviors of the HLD."[2] The third relationship in an HLD, completeness, assesses the correctness of the inference that the learner can successfully enter the HLD at the prescribed instructional level.[3]

---

[1] J. Marvin Cook and Henry H. Walbesser. How to Meet Accountability. Beltsville, Maryland: Walbesser and Associates, 1973, p. 120.

[2] Ibid., p. 120.

[3] Ibid., p. 121.

The standard of .80 is established for the desired level of each of the three relationships within each HLD. This standard is commonly used in the initial validation of learning hierarchies. The .80 level should not be viewed as the desired level when the curriculum is finally completed, because with the .80 standard, twenty percent of the learner population is unaccounted for. Yet, for the first revision, .80 is quite workable. More severe demands should be made on each HLD with each new tryout, ultimately working to .95 or higher. Failure to meet the established standard .80 in this analysis, on any one of the three relationships, indicates that the HLD is in need of revision.

When "adequacy" is low the following checks are to be made:

a. Check the possibility that the TERMINAL objective (in the instructional triad) needs revision first by examining assessment task results and second by examining each assessment task and each instructional activity for:

- Item errors or poor items
- Performance agreement of triad components
- Clarity (Teacher Ratings)
- Appropriateness (Teacher Ratings)
- Power level (Puissance Index)
- Reading complexity (SMOG Grade)
- Materials or equipment required for instruction

b. Check the possibility that there is too great a jump between the subordinate objective(s) and the terminal objective of the HLD.

When "consistency" is low:

a. Check the possibility that the SUBORDINATE objective (in the instructional triad) is in need of revision, first by examining the assessment task results and second by examining each assessment task and each instructional activity the same as in (a) above.

b. Check the possibility of omitting the immediate subordinate objectives (s).

Low "completeness" indicates that the students did not master the subordinate objective nor the terminal objective in the HLD. In this case the possibility of extending the hierarchy by adding objectives which build upon the behaviors that the student already possesses should be examined.

In addition to the analysis of each HLD, an analysis is made of each instructional triad in which the behavioral objective was not mastered by at least 80 percent (.80 standard) of the students. This is especially essential for hierarchies with few HLD's. When it is found that less than 80 percent of the students have mastered an objective, each assessment task and instructional activity should be checked for:

- Item errors or poor items
- Performance agreement of triad components
- Clarity (Teacher Ratings)
- Appropriateness (Teacher Ratings)
- Power level (Puissance Index)
- Reading complexity (SMOG Grade)
- Materials or equipment required for instruction.

1. Science. The science curriculum hierarchies are discussed on the following several pages. Table III-27 presents the adequacy, consistency, and completeness ratios for science observing hierarchy level one. Of the 19 HLD's shown in Table III-27, four fail to meet the .80 standard for adequacy, consistency, and completeness and 15 are at or exceed the .80 standard. These are excellent results for a first try-out.

Adequacy, consistency, and completeness ratios are only valid for HLD's completed by ten or more students. Therefore, HLD's completed by fewer than ten students are not shown or discussed. Ratios are not computed when only a part of the HLD has been completed by students. Three of the four HLD's in need of revision (Table III-27) appear at the

TABLE III-27

DECISION TO ACCEPT OR REVISE OBJECTIVES BASED ON HYPOTHESIS OF LEARNING DEPENDENCY RATIOS FOR SCIENCE OBSERVING HIERARCHY LEVEL 1

HLD Objective Number		Ratios			
Terminal	Subordinate(s)	Adequacy	Consistency	Completeness	Decision[1]
2	1	.69*	.87	.73*	Revise
3	2	.88	.68*	.72*	Revise
4	3	.95	.72*	.95	Revise
5	4	.89	.92	.98	Accept
6	5	.88	.98	.91	Accept
7	6	.87	.93	.83	Accept
8	7	1.00	.94	.85	Accept
9	3	.93	.83	.80	Accept
10	9	.92	.83	.90	Accept
11	10	.92	.85	.96	Accept
12	11	.89	.94	.96	Accept
13	12	.88	.92	.85	Accept
14	8,13	1.00	.84	1.00	Accept
15	14	.91	1.00	1.00	Accept
16	15	.91	.86	.91	Accept
17	16	.88	.90	.90	Accept
19	17	.97	.92	.90	Accept
21	17	1.00	.86	.97	Accept
22	21	.36*	1.00	.80	Revise

1 The decisions should be used as a guide for curriculum writers.

* Ratio is below the 80% standard.

beginning of the sequence and involve behavioral objectives 1, 2, 3, and 4. The fourth HLD involves behavioral objectives 21 and 22. These four HLD's should be the principal focus of the revision of this learning hierarchy. No other HLD's should be altered.

A decision to revise was reached because of the failure to meet the .80 standard on one or more of the three relationships: adequacy, consistency, or completeness. The HLD which has objective 2 as the terminal behavior and objective 1 as the immediate prerequisite shows the values of adequacy and completeness below the .80 standard. Research in such revision activity has shown that attempting to correct one relationship per revision is a better strategy than trying to deal with all relationships in need of revision at once. Further, the best results in revision are obtained by attempting to correct the relationship with the lowest ratio first. Therefore, in the HLD involving objectives 2 and 1, the adequacy ratio becomes the target during the first round of revisions. A low adequacy is a result of more (0,1)'s than expected.[4] The (0,1)'s occur when the student is able to exhibit all of the immediate subordinate behaviors, has been present during the two instructional activities, but cannot exhibit the terminal behavior (which is defined by acquisition of all three assessment tasks).

The analysis attempts to identify the most likely cause or causes for the need to revise, following the steps outlined previously. The first step is always to examine the assessment task results. This is done in order to determine whether the nonacquisition of the terminal objective is a result of one poor assessment task. A poor assessment task is considered to be one that contributed most often to the non-

---

[4] The (0,1) is considered an ordered pair. The first number of the ordered pair of numbers within the parentheses indicates acquisition (1) or nonacquisition (0) of the terminal behavior in the HLD and the second element in the ordered pair is associated with acquisition (1) or nonacquisition (0) of all hypothesized prerequisite subordinate behaviors.

mastery of an objective (students must successfully complete all three assessment tasks to demonstrate mastery of an objective). Since it is the terminal objective of the first HLD in Table III-27 that is contributing to the nonmastery, each assessment task result for objective 2 was examined. Appendix C reports the assessment results of each assessment task for each objective with the decision to revise on the HLD tables and also for each objective not mastered by at least 80 percent of the students.

A facsimile and explanation of the table headings in Appendix C are below:

		Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	Level	A.T. 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
1	1	78%	2%	8%	0%	5%	0%	2%	3%

The results shown above reveal that for objective 1, level 1:

- 78% of the students successfully completed all three assessment tasks (A.T. 1, 2, and 3);
- 2% of the students successfully completed tasks 1 and 2 but not A.T. 3.
- 8% of the students successfully completed A.T. 1 and 3 but not A.T. 2.
- 0% (none) of the students successfully completed A.T. 1 but not A.T. 2 and 3.
- 5% of the students successfully completed A.T. 2 and 3 but not A.T. 1.
- 0% (none) of the students successfully completed A.T. 2 but not A.T. 1 and 3.
- 2% of the students successfully completed A.T. 3 but not A.T. 1 and 2.
- 3% of the students did not successfully complete any of the tasks.

Table C-1 in Appendix C reveals that for objective 2, three percent of the students did not master assessment task 1 while mastering the other two tasks. Fifteen percent of the students did not master assessment task 2 while mastering the other assessment tasks. Nine percent of the students did not master assessment task 3 while mastering assessment tasks 1 and 2. Two poor assessment tasks for the same objective (i.e., tasks 2 and 3) are unlikely. Therefore, assessment task error does not seem to be a reasonable explanation for the low adequacy ratio. When adequacy is low and no single assessment task is at fault, all assessment tasks should be reviewed for performance agreement, clarity, and materials or equipment required. Next, the instructional activities should be checked.

Another important part of the analysis is the teacher ratings of objective 2 (Table D-1, Appendix D). Low ratings were assigned by teachers for clarity for instructional activity 1, assessment task 2, and assessment task 3. The reading complexity (SMOG Grade) and power level (Puissance Index) are not provided in this report for each individual instructional triad.[5] However, the mean SMOG and Puissance values for all objectives within a level are presented in Appendices E and F, respectively. If individual values for the instructional triad components are not within the .5 range of one another it would suggest that there is not agreement in objective 2. It is always possible that one or more needed immediate prerequisite objectives are missing and that may be the reason for students not acquiring the terminal objective. Since this is the entry level HLD, this inference is quite likely.

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[5] Individual SMOG and Puissance values are to be computed by the curriculum writers.

In light of the findings available, the appropriate recommendations for revision are these: instructional activity 1 should be revised, with particular attention to clarity; the directions and questions of assessment tasks 2 and 3 should be edited for intended meaning; and additional immediate prerequisites in addition to objective 1 should be considered by the subject matter expert. The search for possible additions to the prerequisite is facilitated by reviewing the task analysis and task listing used to generate the original hierarchy.

A similar analysis to the one just completed for the first HLD in Table III-27 should be conducted for the remaining three HLD's for which the data indicate a decision to revise. Additional science HLD's in need of revision are identified in Tables III-28 through Tables III-31.

All of the science objectives were examined in terms of the percentage of students mastering an objective. The .80 standard was set. All of the objectives that were not mastered by at least 80 percent of the students are possibly in need of revision. The analysis should follow the procedure outlined previously. Figure III-5 is a display of the level one science observing objectives. The number of students attempting each objective is indicated and the percent of students who successfully completed (mastered all three assessment tasks) each objective is indicated. The 80 percent line is indicated in the Figure for easy identification of those objectives that do not reach the .80 standard. Of 21 objectives in level one science, 8 fall short of the .80 standard. Objective 3 is isolated for exemplary analysis. This objective was attempted by 201 students and mastered by 72 percent of the students. Table C-1 in Appendix C reveals that on the three assessment tasks only one percent of the students was unsuccessful on assessment task 1 while mastering tasks 2 and 3. Four percent of the

TABLE III-28

DECISION TO ACCEPT OR REVISE OBJECTIVES BASED ON HYPOTHESIS OF LEARNING DEPENDENCY RATIOS FOR SCIENCE OBSERVING HIERARCHIES LEVELS 2&3

HLD		Ratios			
Objective Number					
Terminal	Subordinate	Adequacy	Consistency	Completeness	Decision[1]
Level 2					
25	24	.96	.77*	.93	Revise
26	25	.79*	.92	.97	Revise
27	26	.79*	.84	.86	Revise
28	27	.84	.82	.84	Accept
29	28	.74*	.87	.81	Revise
30	29	.88	.78*	.76*	Revise
32	31	.93	.78*	.84	Revise
33	32	.74*	.93	.73*	Revise
34	33	.93	.81	.97	Accept
Level 3					
36	35	.66*	.77*	.69*	Revise
37	36	.85	.51*	.74*	Revise
38	37	.62*	.87	.87	Revise
39	38	.71*	.76*	.89	Revise
41	40	.90	.87	.93	Accept

1 The decisions should be used as a guide for curriculum writers.

* Ratio is below the 80% standard.

TABLE III-29

DECISION TO ACCEPT OR REVISE OBJECTIVES BASED ON HYPOTHESIS OF LEARNING DEPENDENCY RATIOS FOR SCIENCE OBSERVING HIERARCHIES LEVEL 4-6

HLD Objective Number		Ratios			
Terminal	Subordinate	Adequacy	Consistency	Completeness	Decision[1]
Level 4					
43	42	.52*	.60*	.56*	Revise
44	43	.69*	.47*	.46*	Revise
45	44	.76*	.72*	.76*	Revise
46	45	.67*	.81	.79*	Revise
47	46	.82	.74*	.88	Revise
Level 5					
49	48	.48*	.75*	.42*	Revise
50	49	.87	.48*	.53*	Revise
52	51	.33*	.10*	.10*	Revise
53	52	.62*	1.00	.62*	Revise
56	55	.50*	.09*	.12*	Revise
57	56	.00*	.00*	.00*	Revise
58	57	.50*	.09*	.12*	Revise
Level 6					
63	62	.77*	.95	.91	Revise
64	63	.72*	.79*	.92	Revise

1 The decisions should be used as a guide for curriculum writers.

* Ratio is below the 80% standard.

TABLE III-30

DECISION TO ACCEPT OR REVISE OBJECTIVES BASED ON HYPOTHESIS OF LEARNING DEPENDENCY RATIOS FOR SCIENCE LABORATORY TECHNIQUES HIERARCHY LEVEL 7

HLD		Ratios			
Objective Number					
Terminal	Subordinate(s)	Adequacy	Consistency	Completeness	Decision[1]
12	11	.89	.83	1.00	Accept
13	11	.95	.88	1.00	Accept
14	11	.88	.92	.98	Accept
15	14	.97	1.00	.96	Accept
15	12,13,14	.97	.87	.91	Accept
16	15	1.00	.97	1.00	Accept
17	16	.93	1.00	1.00	Accept
18	17	.90	.85	.90	Accept
19	18	.80	.85	.90	Accept
20	19	.75*	.85	.90	Revise
21	15	.80	.98	.92	Accept
22	21	.89	.97	.97	Accept
23	22	.97	.97	.87	Accept
24	23	.84	.87	.96	Accept
25	24	1.00	.84	1.00	Accept
26	20	1.00	1.00	1.00	Accept
28	27	.94	1.00	1.00	Accept
28	26,27	.84	.78*	1.00	Revise
29	28	.81	.96	1.00	Accept
30	29	.93	.90	.90	Accept
31	30	.92	.97	.87	Accept

1 The decisions should be used as a guide for curriculum writers

* Ratio is below the 80% standard.

TABLE III-31

DECISION TO ACCEPT OR REVISE OBJECTIVES BASED ON HYPOTHESIS OF LEARNING DEPENDENCY RATIOS FOR SCIENCE AND SUPERSTITION AND MATTER HIERARCHIES LEVEL 7

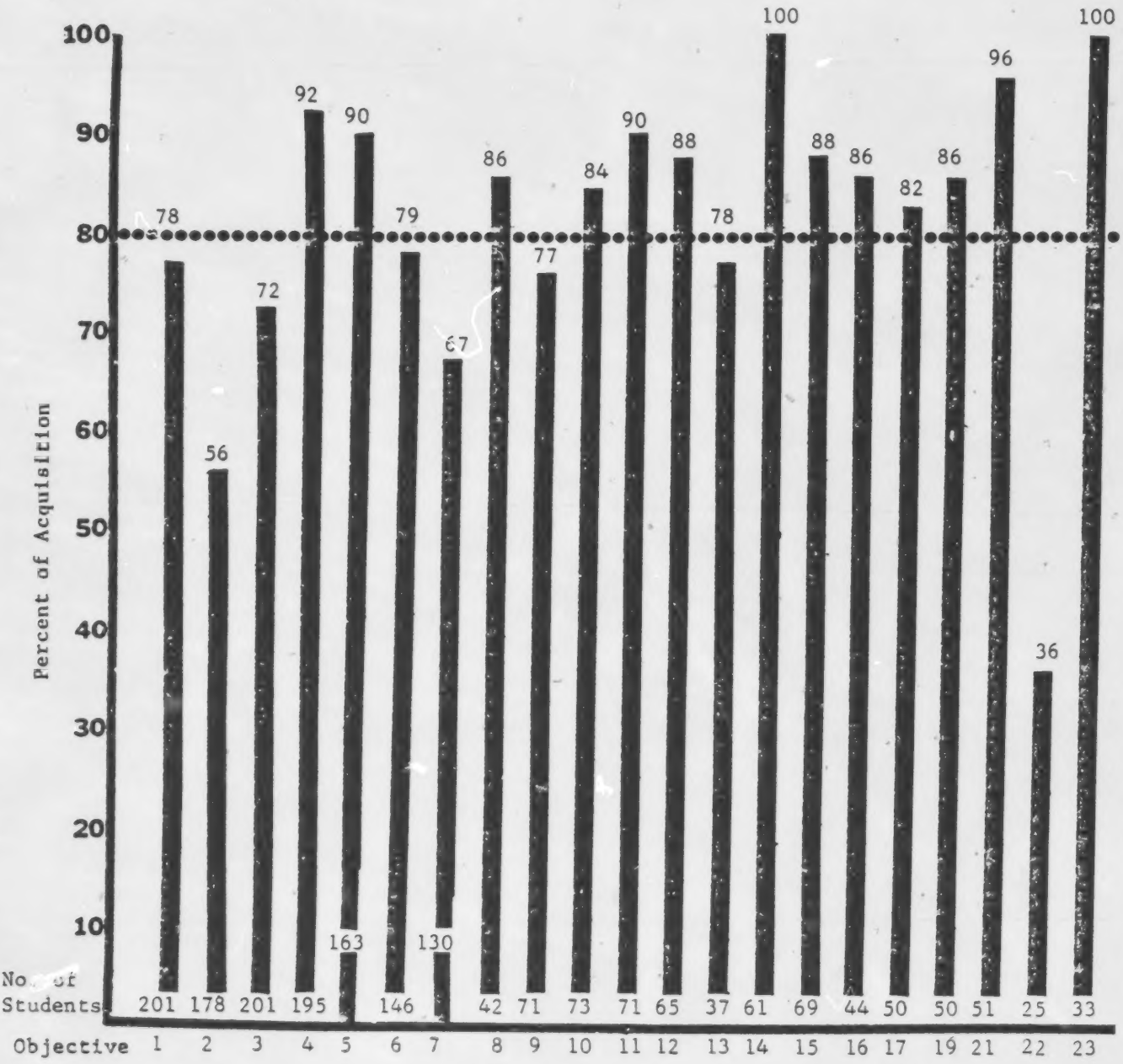
HLD Objective Number		Ratios			
Terminal	Subordinate(s)	Adequacy	Consistency	Completeness	Decision[1]
Science and Superstition					
3	1	.85	.37*	.40*	Revise
3	1,2	.96	.69*	.91	Revise
4	3	.91	.91	.93	Accept
5	4	.86	.92	.90	Accept
6	5	.95	.80	.92	Accept
7	6	.90	.95	.93	Accept
8	6	.94	.87	.94	Accept
9	8	.73*	.70*	.73*	Revise
9	7,8	.98	.85	.98	Accept
10	9	.93	.92	.94	Accept
Matter					
33	32	1.00	.94	.97	Accept
34	33	.97	1.00	.97	Accept
35	34	1.00	.95	1.00	Accept
36	34	.59*	1.00	1.00	Revise
37	35,36	1.00	.60*	1.00	Revise
38	37	1.00	1.00	1.00	Accept

1 The decisions should be used as a guide for curriculum writers

* Ratio is below the 80% standard.

FIGURE III-5

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL ONE OBSERVING OBJECTIVES IN SCIENCE



students were unsuccessful on assessment task 2 while mastering tasks 1 and 3. However, 16 percent of the students were unsuccessful on assessment task 3 while mastering tasks 1 and 2. This seems to indicate that assessment task 3 may be the cause of the mastering of objective 3 by 72 percent of the students. Table D-1 in Appendix D reveals that teachers did not rate any of the components (instructional activities 1 and 2, and assessment tasks 1, 2 and 3) of objective 3 low, nor did they rate the objective itself low in appropriateness, clarity, effectiveness, student interest, student attention, student attitude, and teacher attitude. Table E-2, Appendix E, shows that the mean SMOG grade for all level one objectives not mastered by 80 percent of the students was 6.0 for the instructional activities and 3.7 for the assessment tasks. The SMOG grade for assessment task 3 individually, while not shown, is critical. The same applies for the Puissance value of assessment task 3. The mean Puissance values for all level one objectives not mastered by 80 percent of the students (Tables F-2, Appendix F) were 4.6 for the behavioral objective, 3.4 for the instructional activities, and 4.4 for the assessment tasks. The same kind of an individual analysis must be done on all of the objectives not mastered by at least 80 percent of the students. This includes the objectives shown below the .80 standard in Figures III-6 through III-13. Briefly, the results show:

- For science level two (Figure III-6), three of the 11 objectives were mastered by at least 80 percent of the students. The average Puissance values for not mastered behavioral objectives, instructional activities, and assessment tasks were higher than for those objectives mastered (compare Tables F-1 and F-2 in Appendix F).

- For science level three (Figure III-7), three of the seven objectives were mastered by at least 80 percent of the students. The average Puissance values for the not mastered behavioral objectives and instructional activities were higher than those assigned to objectives that were mastered (Appendix F).

FIGURE III-6

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL TWO OBSERVING OBJECTIVES IN SCIENCE

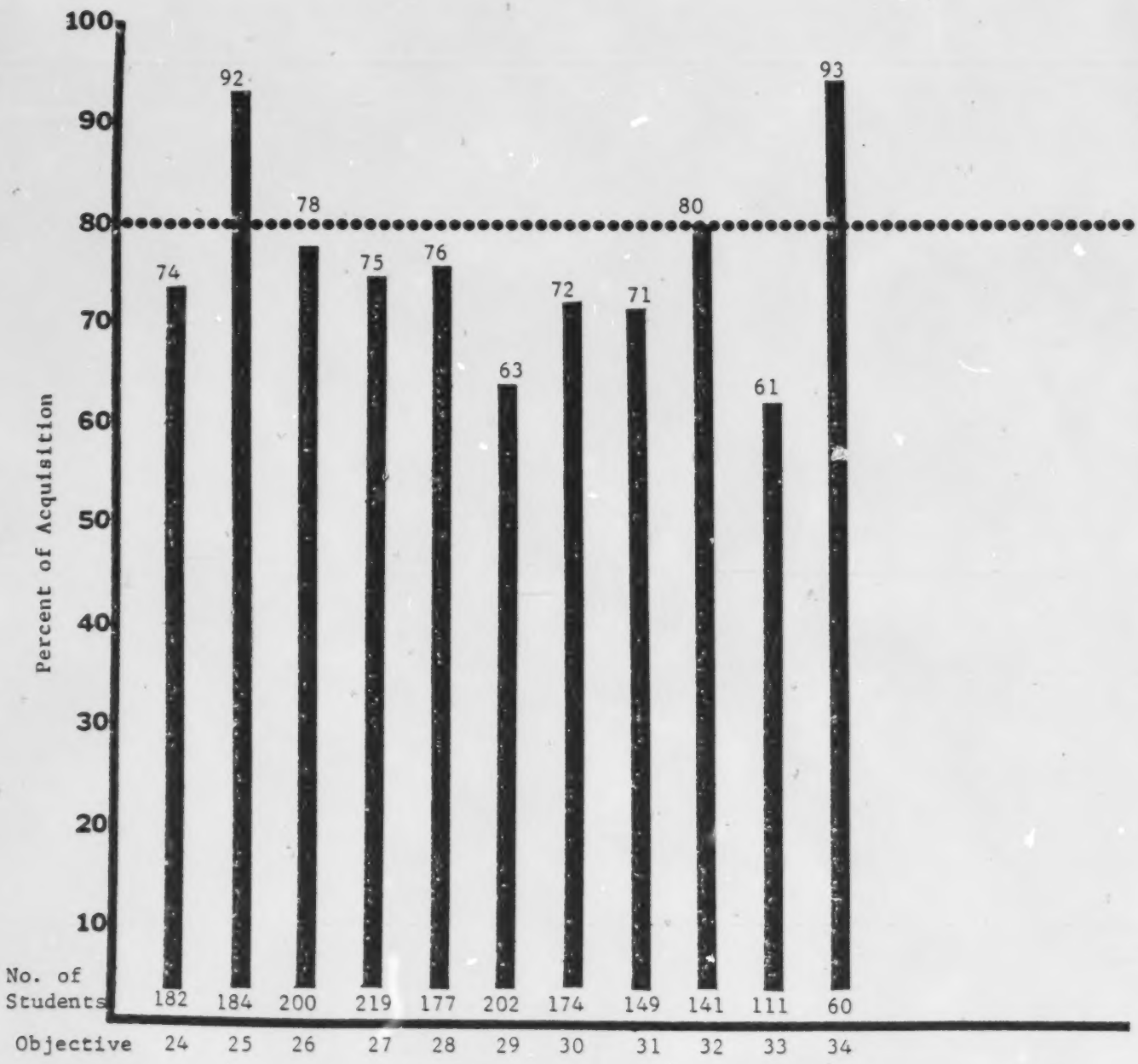


FIGURE III-7

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL THREE OBSERVING OBJECTIVES IN SCIENCE

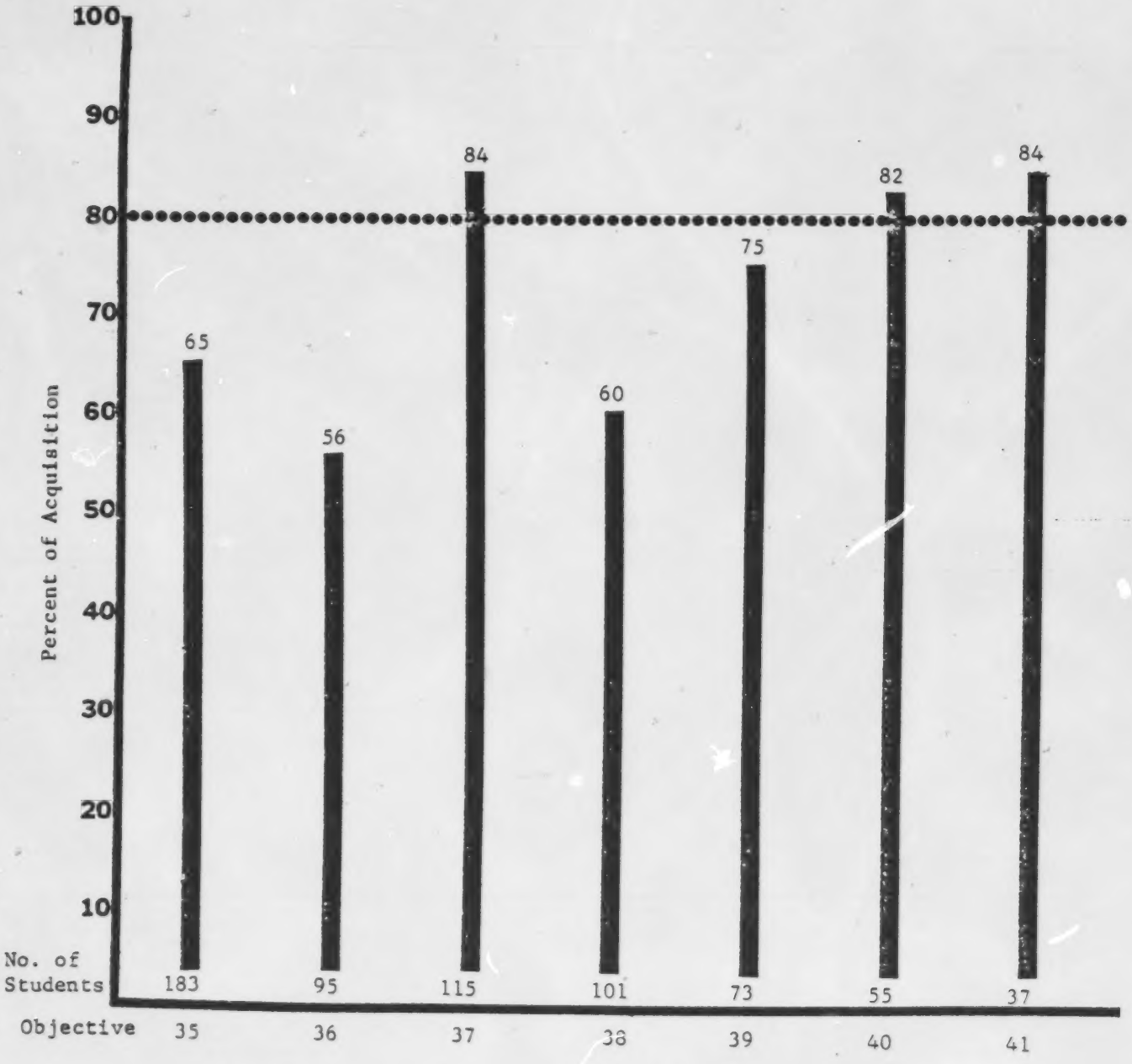


FIGURE III-8

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL FOUR OBSERVING OBJECTIVES IN SCIENCE

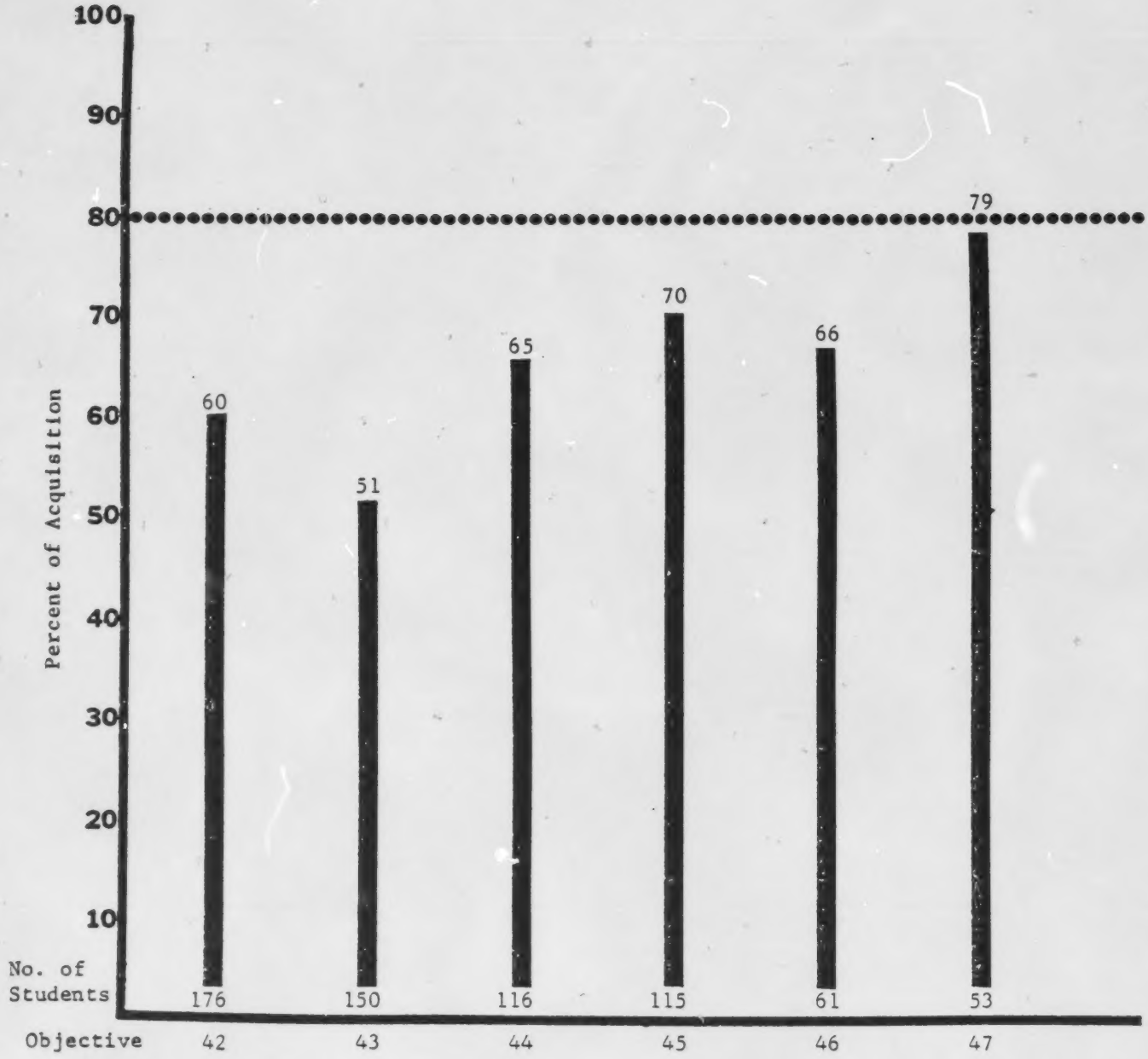


FIGURE III-9

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL FIVE OBSERVING OBJECTIVES IN SCIENCE

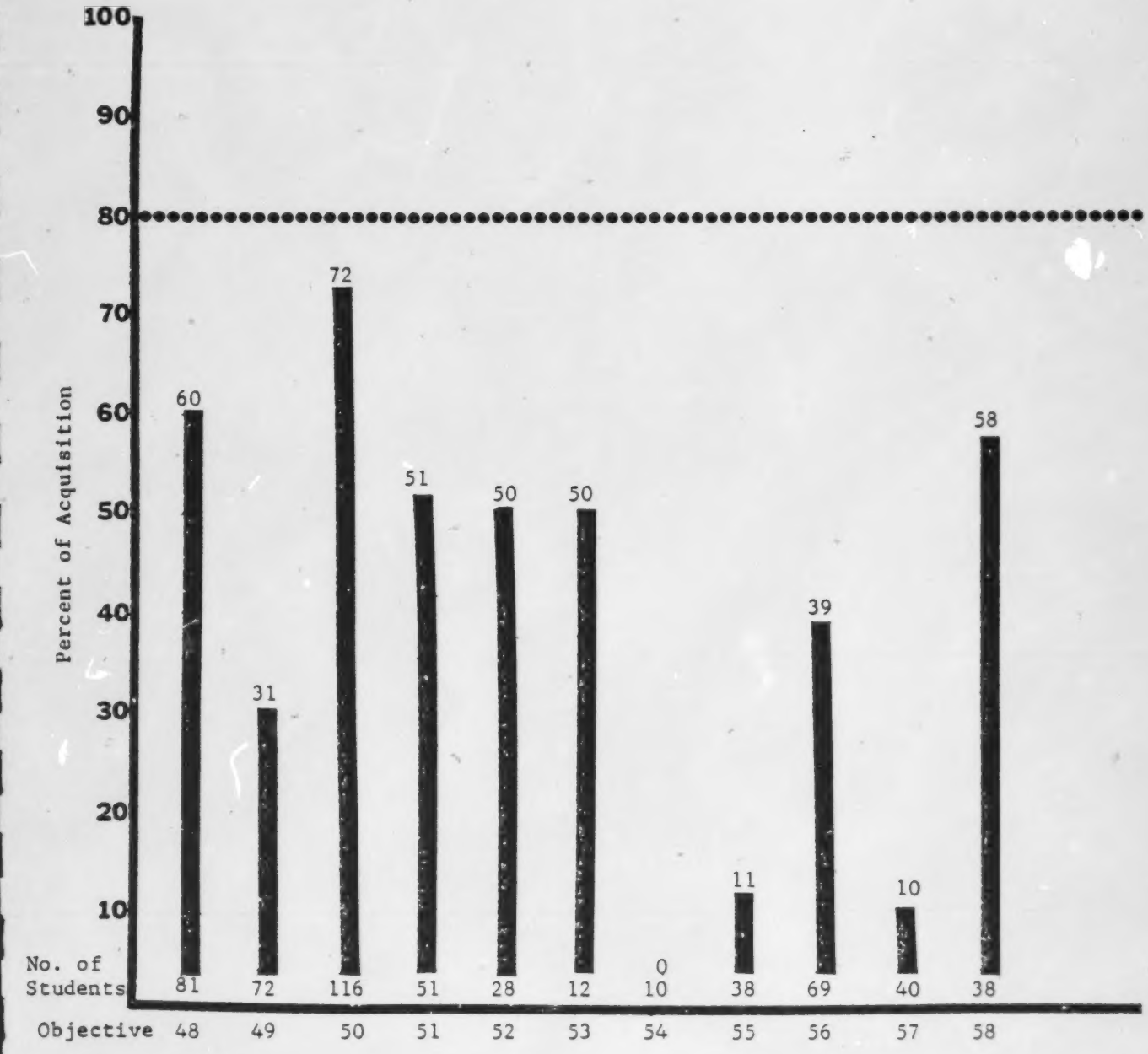


FIGURE III-10

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LEVEL SIX OBSERVING OBJECTIVES IN SCIENCE

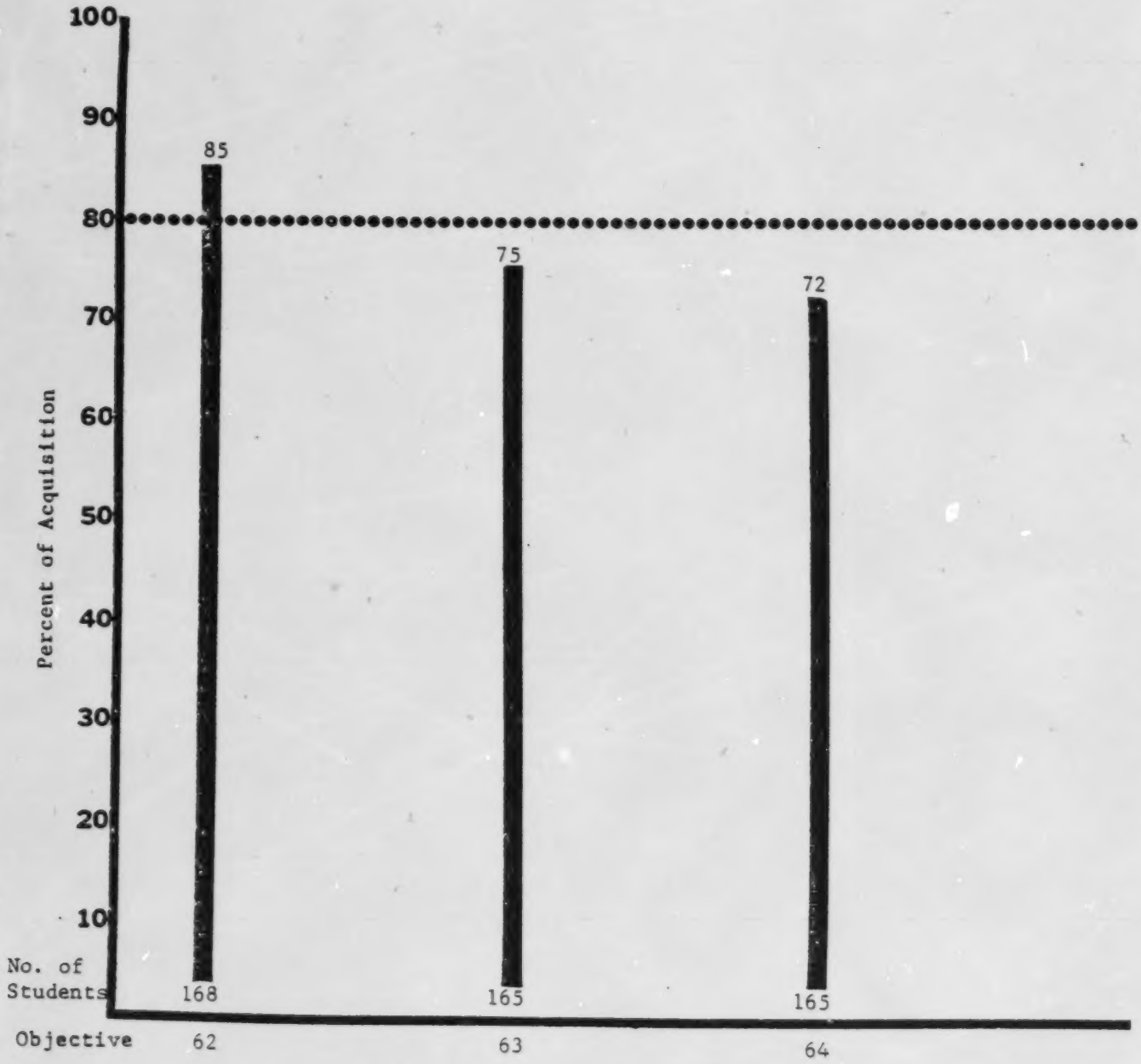


FIGURE III-11

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE SCIENCE AND SUPERSTITION
OBJECTIVES IN SCIENCE
LEVEL 7

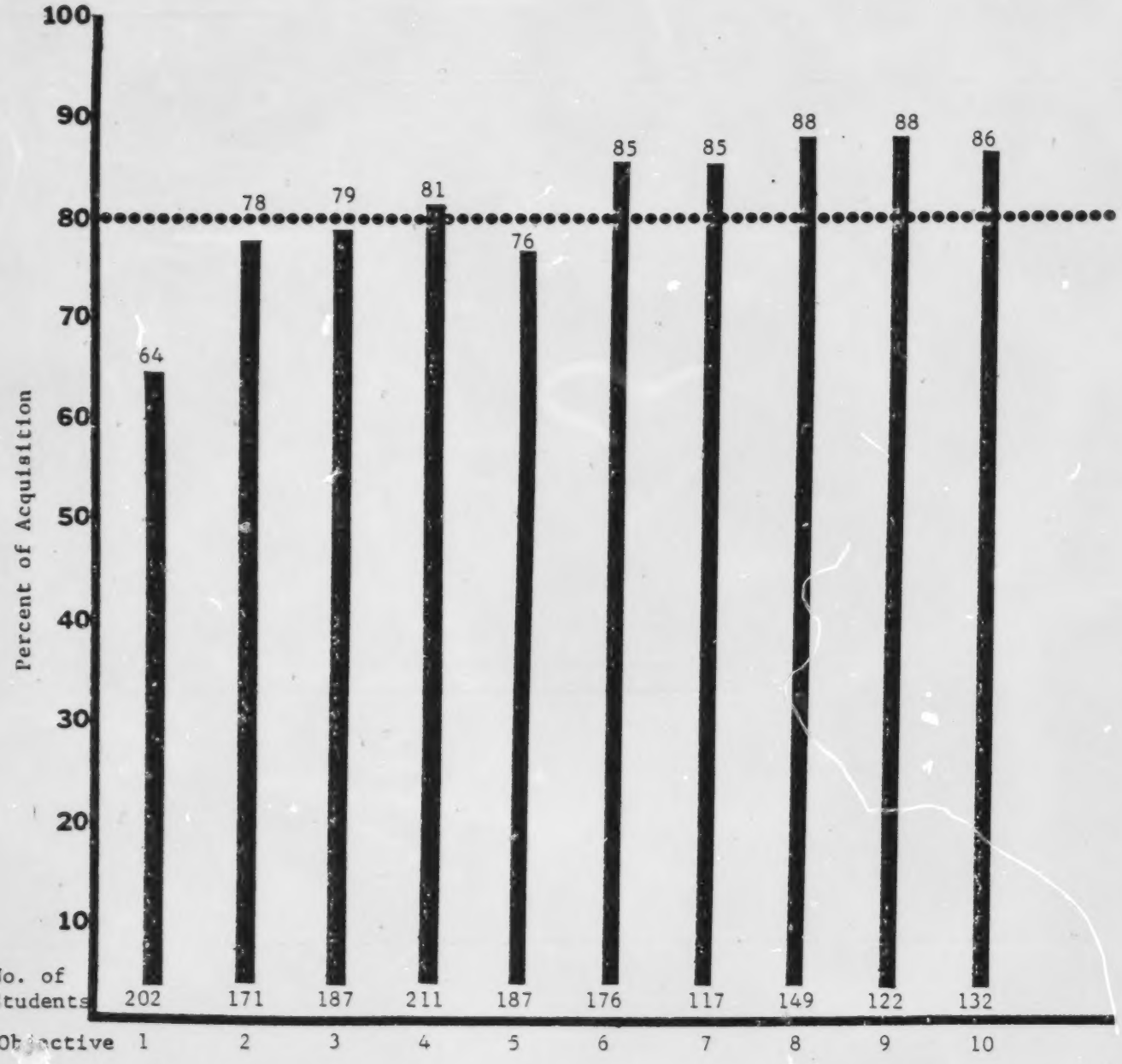


FIGURE III-12

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE LABORATORY TECHNIQUES OBJECTIVES IN SCIENCE
LEVEL 7

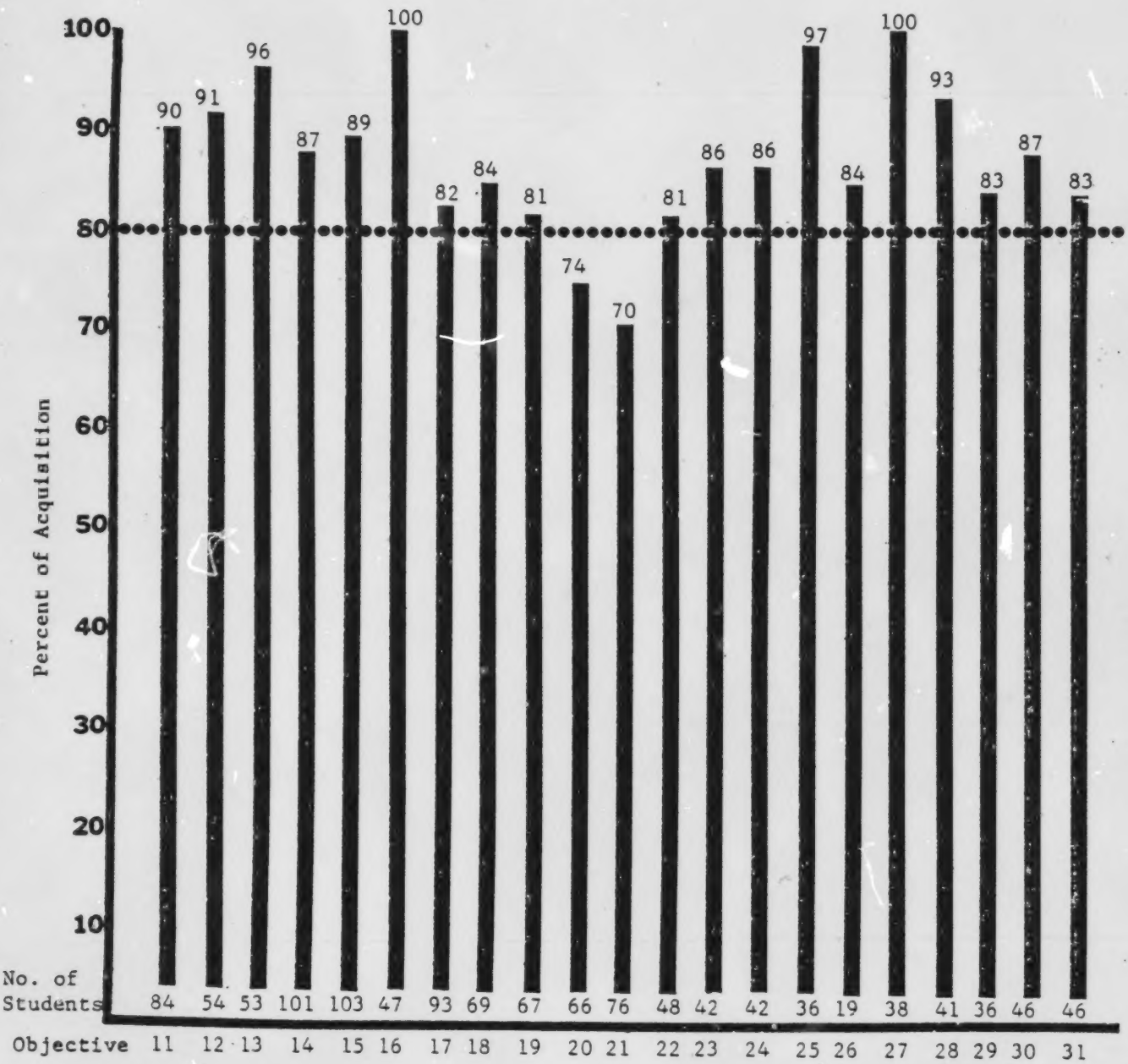
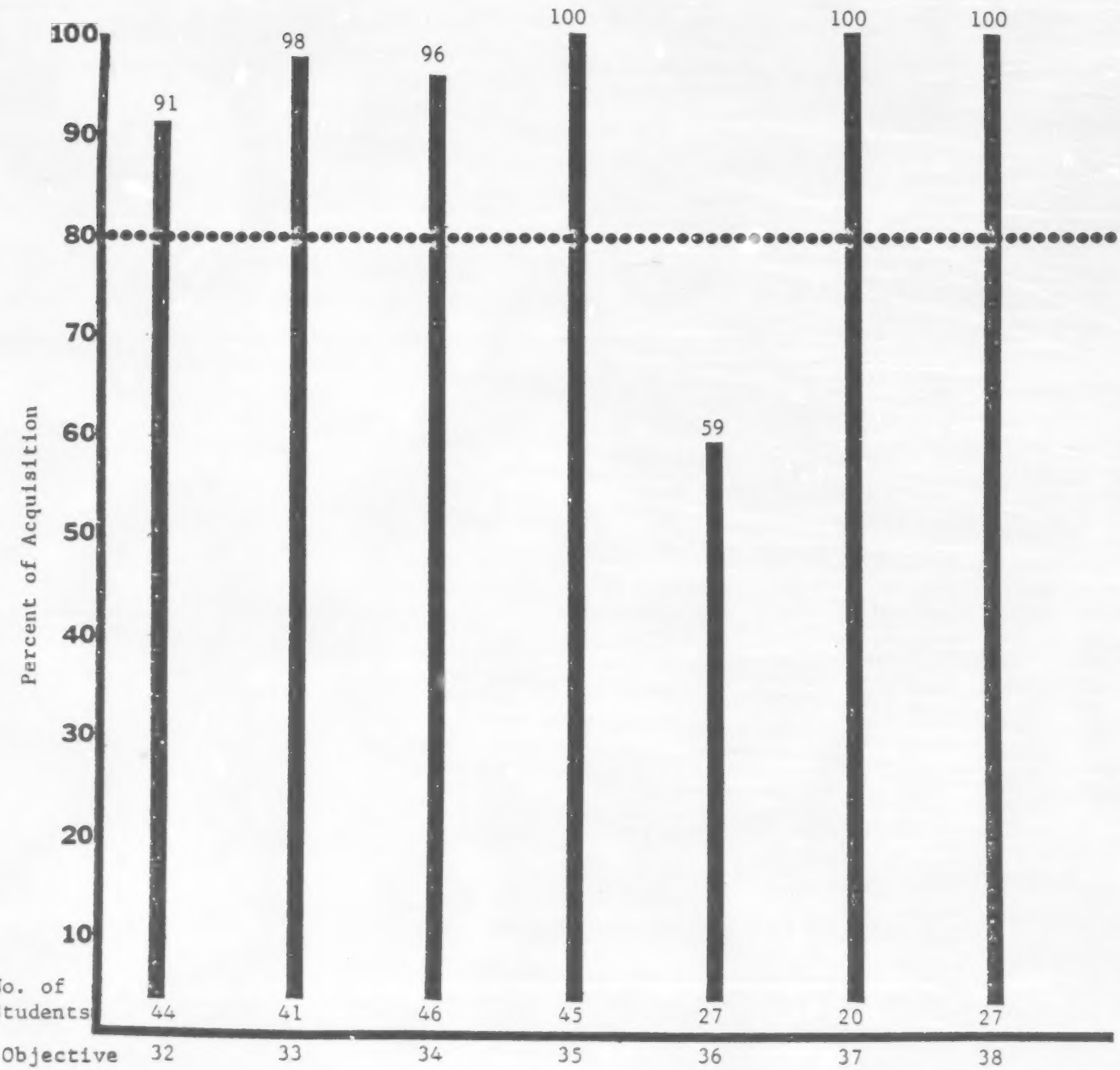


FIGURE III-13

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE MATTER OBJECTIVES
IN SCIENCE
LEVEL 7



- For science level four (Figure III-8), none of the six behavioral objectives was mastered by at least 80 percent of the students.

- For science level five (Figure III-9), none of the 11 objectives was mastered by at least 80 percent of the students.

- For science level six (Figure III-10), one of the three objectives was mastered by at least 80 percent of the students. The average Puissance values for instructional activities and assessment tasks related to the objectives that were nonmastered were higher than those related to objectives mastered (Appendix F).

- For science and superstition level seven (Figure III-11), six of the 10 objectives were mastered by at least 80 percent of the students. The average Puissance values were higher for the objectives mastered than for the objectives not mastered. (Appendix F).

- For science and laboratory techniques level seven (Figure III-12), 19 of the 21 objectives were mastered by at least 80 percent of the students. All average Puissance values were higher for the objectives not mastered than for the objectives mastered (Appendix F).

- For science and matter level seven (Figure III-13), six of the seven objectives were mastered by at least 80 percent of the students. All average Puissance values were higher for the objective not mastered than for the objectives mastered (Appendix F).

2. Language Arts/English. The approach to the development of the hierarchies in language arts/English differed from that of science. The language arts/English hierarchies were constructed with parallel objectives for a particular strand for a given grade level. Such parallelism connotes no dependency relationship (Table III-6, objectives 1.1, 1.2, and 1.3) within a grade level; however, dependencies may be built in across grade levels for a specific strand. In the validation process during 1977-78, the data were secured from teachers who taught the objectives to students in their own classes at one grade level.

These data were compiled by grade level. In order to determine the HLD's across grade levels, it is necessary to consider the data compilations at different grade levels for a certain strand in a hierarchical fashion. This procedure requires that individual teachers use instructional triads for several grade levels with the same students.

In lieu of HLD data, it is important that careful consideration be given to the data showing the percent of students mastering each language arts/English objective levels one through nine. These data are shown in Figures III-14 through III-22. In each figure the line indicating the .80 standard is shown for easy identification of those objectives that were mastered by at least 80 percent of the students and those objectives that were mastered by less than 80 percent of the students. An analysis of the first objective in Figure III-14 (Capitalization 1.1) follows the procedure outlined earlier and provides an example for the analysis of all objectives below the .80 standard.

Objective 1.1 was attempted by 136 students in grade one. The objective was mastered by 63 percent of the students. The results of each assessment task are found in Table C-4, Appendix C. The first step is to determine whether any one assessment task contributed greatly to the nonacquisition of the objective. Assessment task 1 was missed by one percent of the students while assessment tasks 2 and 3 were successfully completed. Assessment task 2 was missed by 6 percent of the students while assessment tasks 1 and 3 were successfully completed. Assessment task 3 was missed by nine percent of the students while assessment tasks 1 and 2 were successfully completed. Two poor assessment tasks (i.e., tasks 2 and 3) are unlikely. No single assessment task appears to be at fault; however, both tasks 2 and 3 should be

FIGURE III-14

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL ONE LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

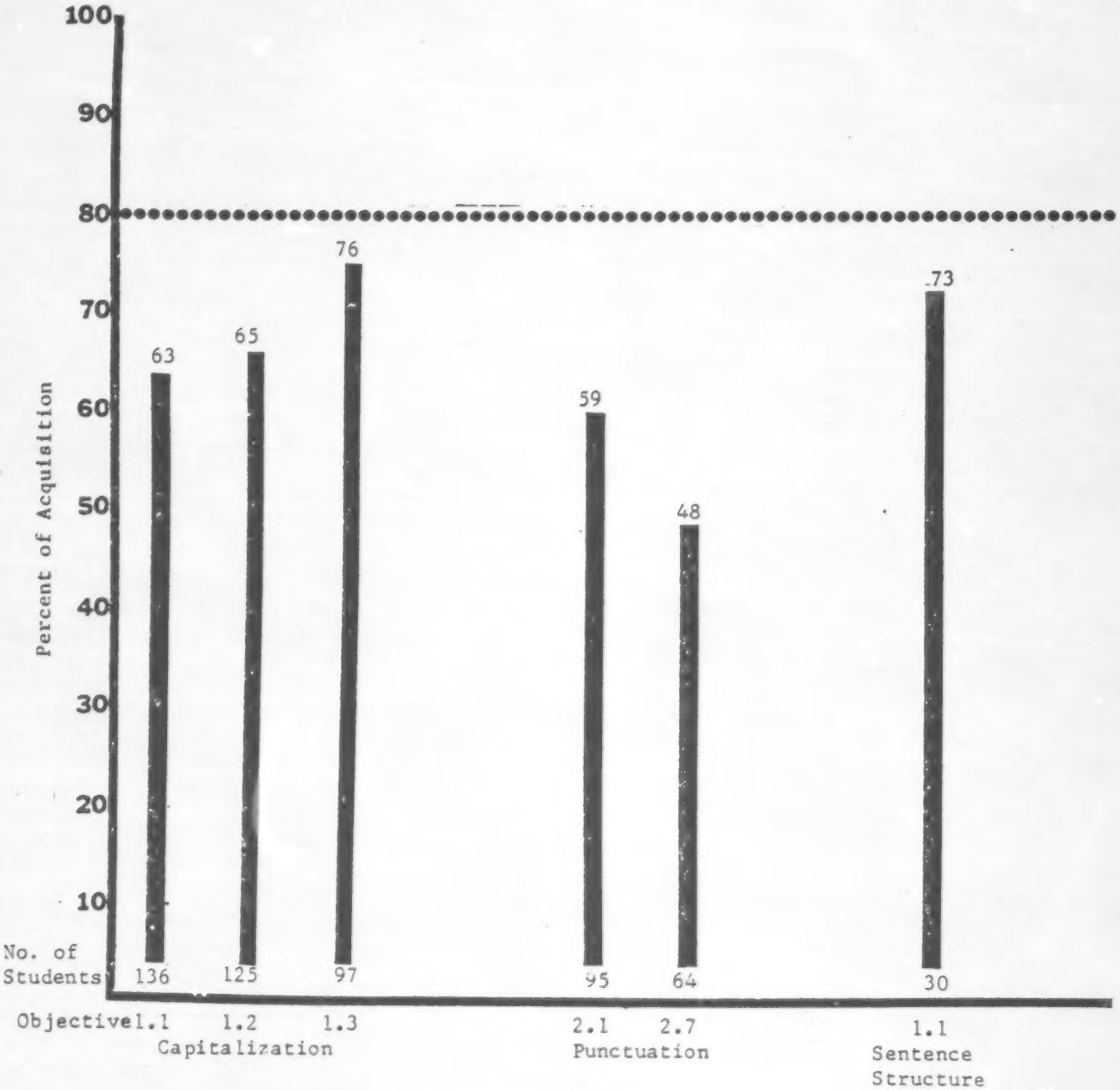


FIGURE III-15

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL TWO LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

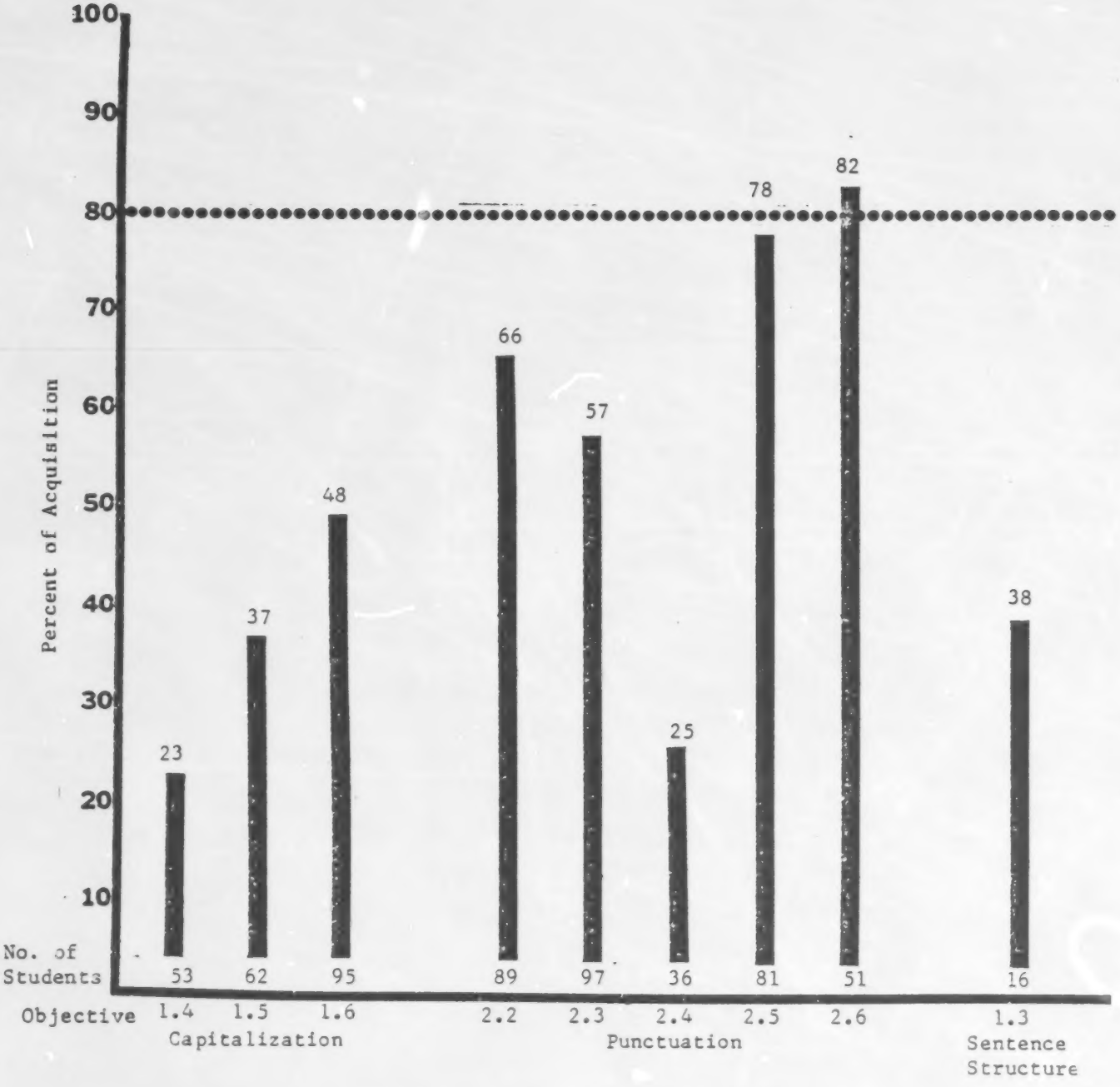


FIGURE III-16

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL THREE LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

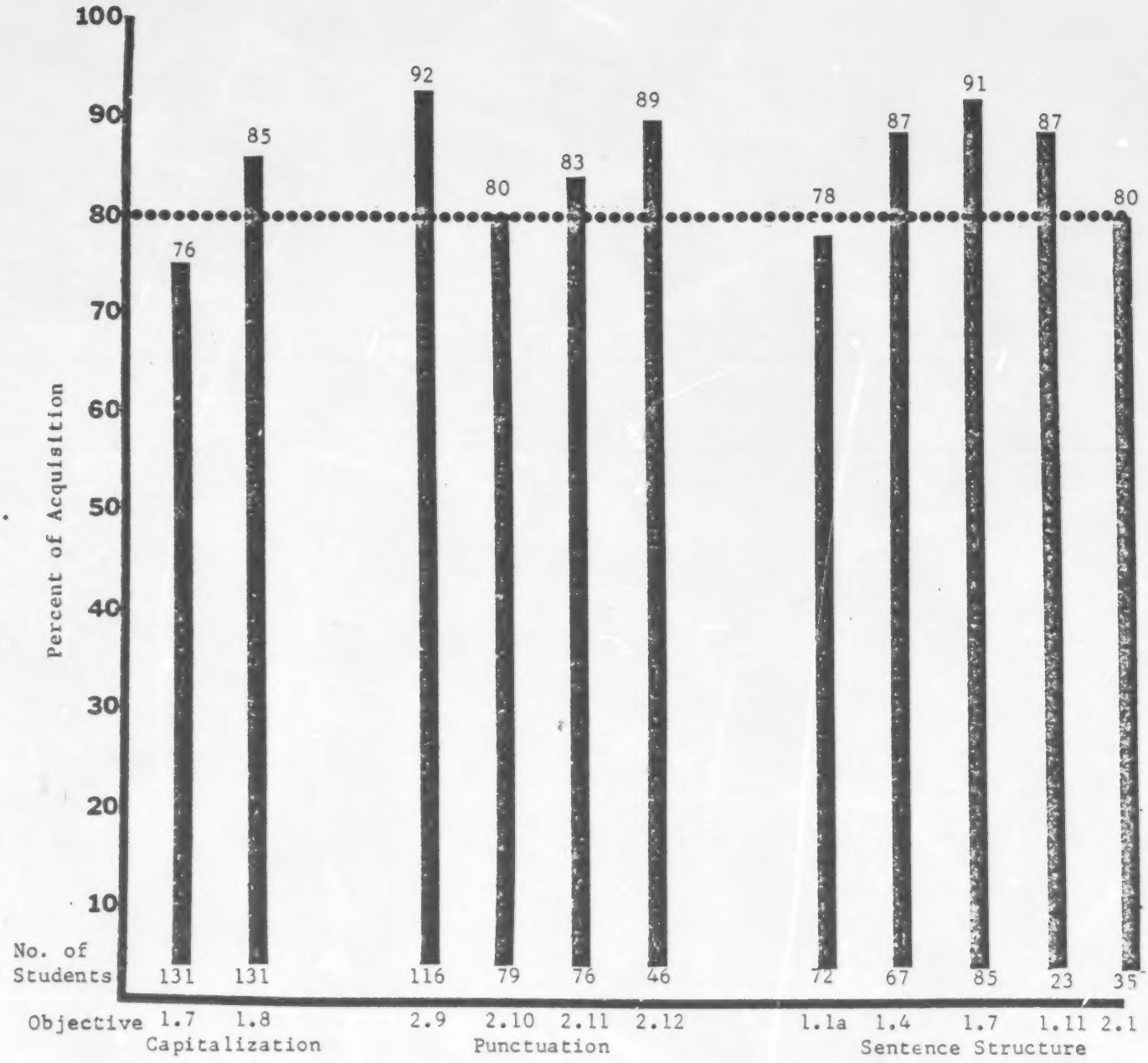


FIGURE III-17

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL FOUR LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

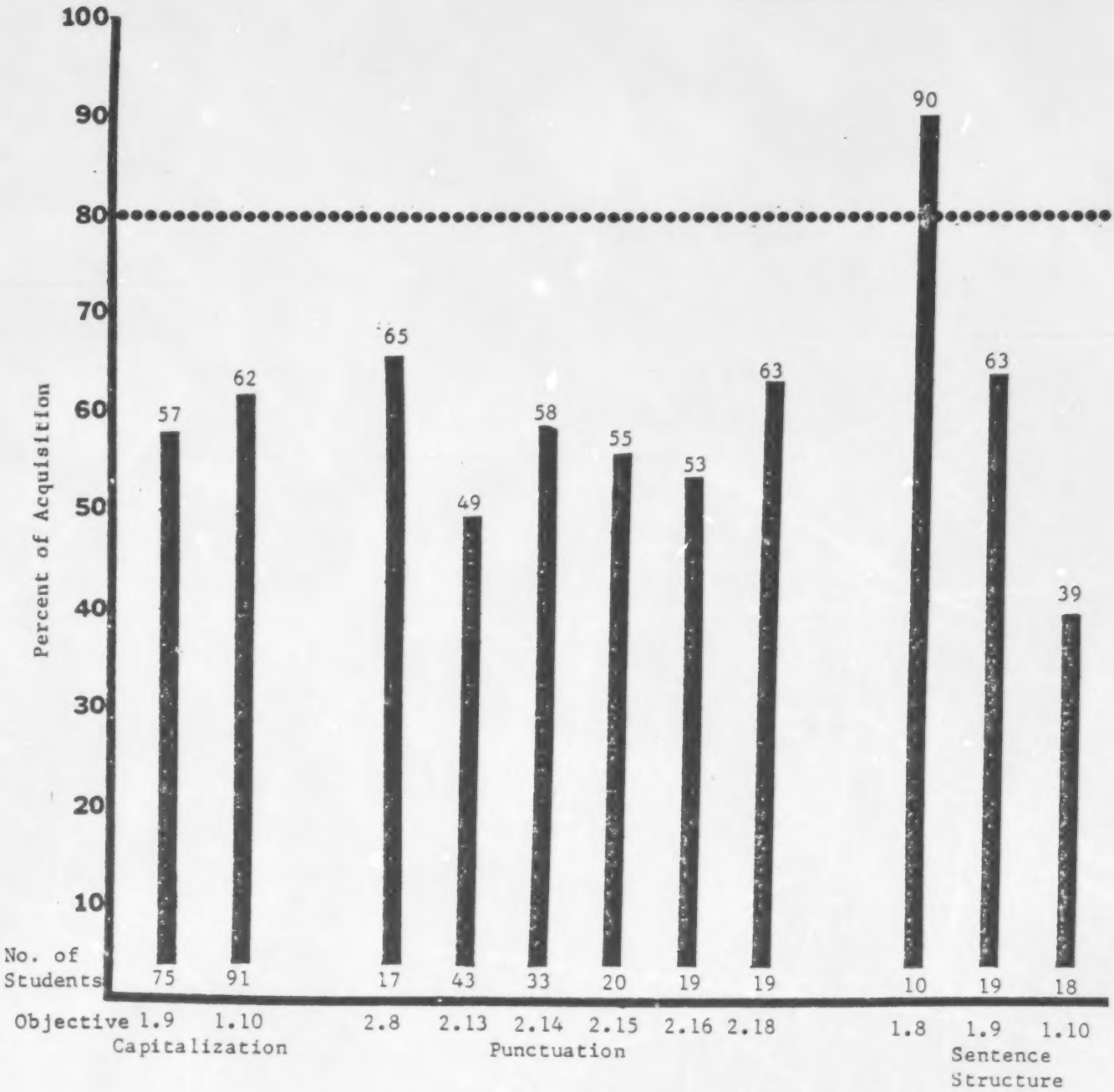


FIGURE III-18

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL FIVE LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

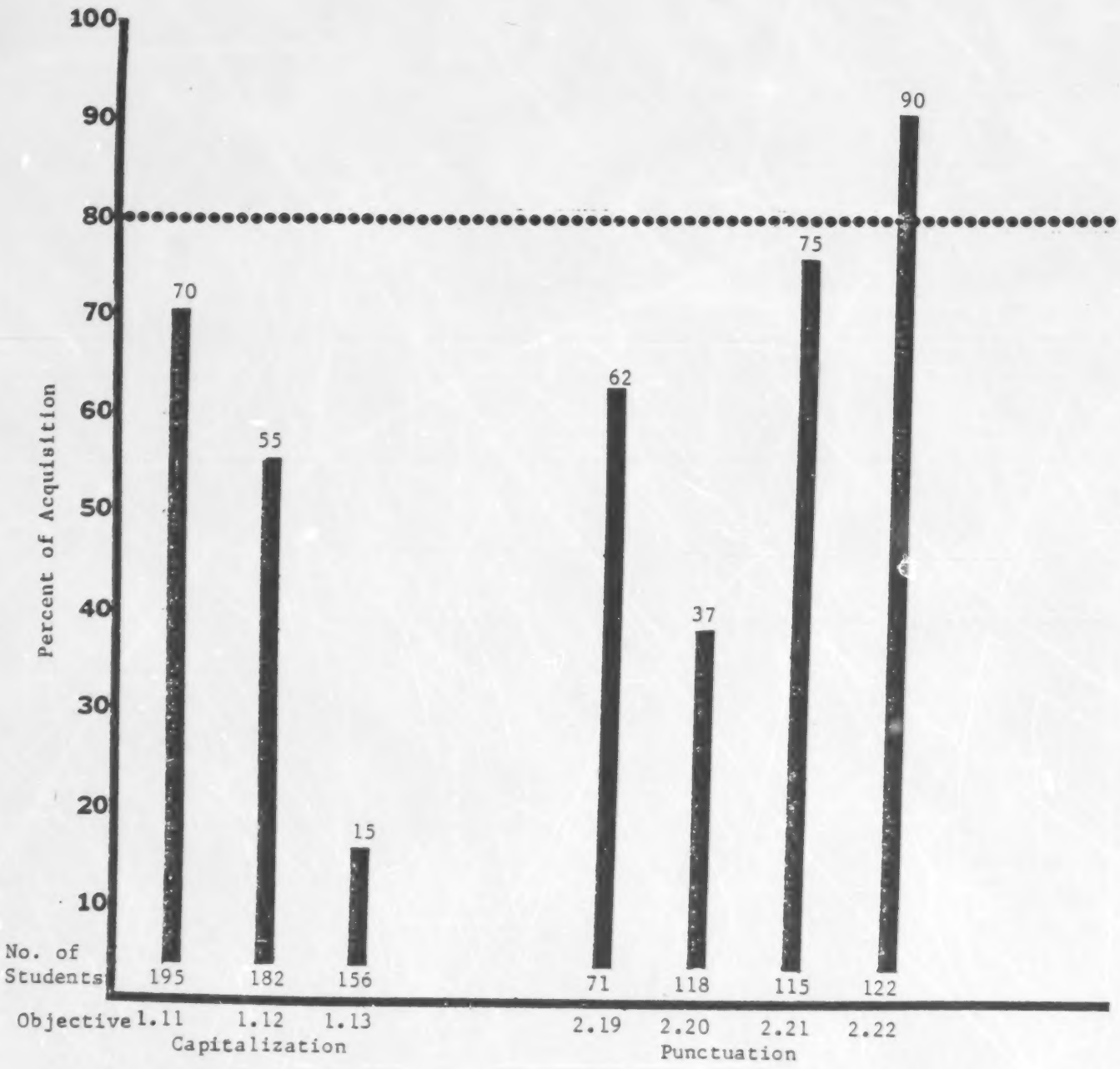


FIGURE III-19

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL SIX LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

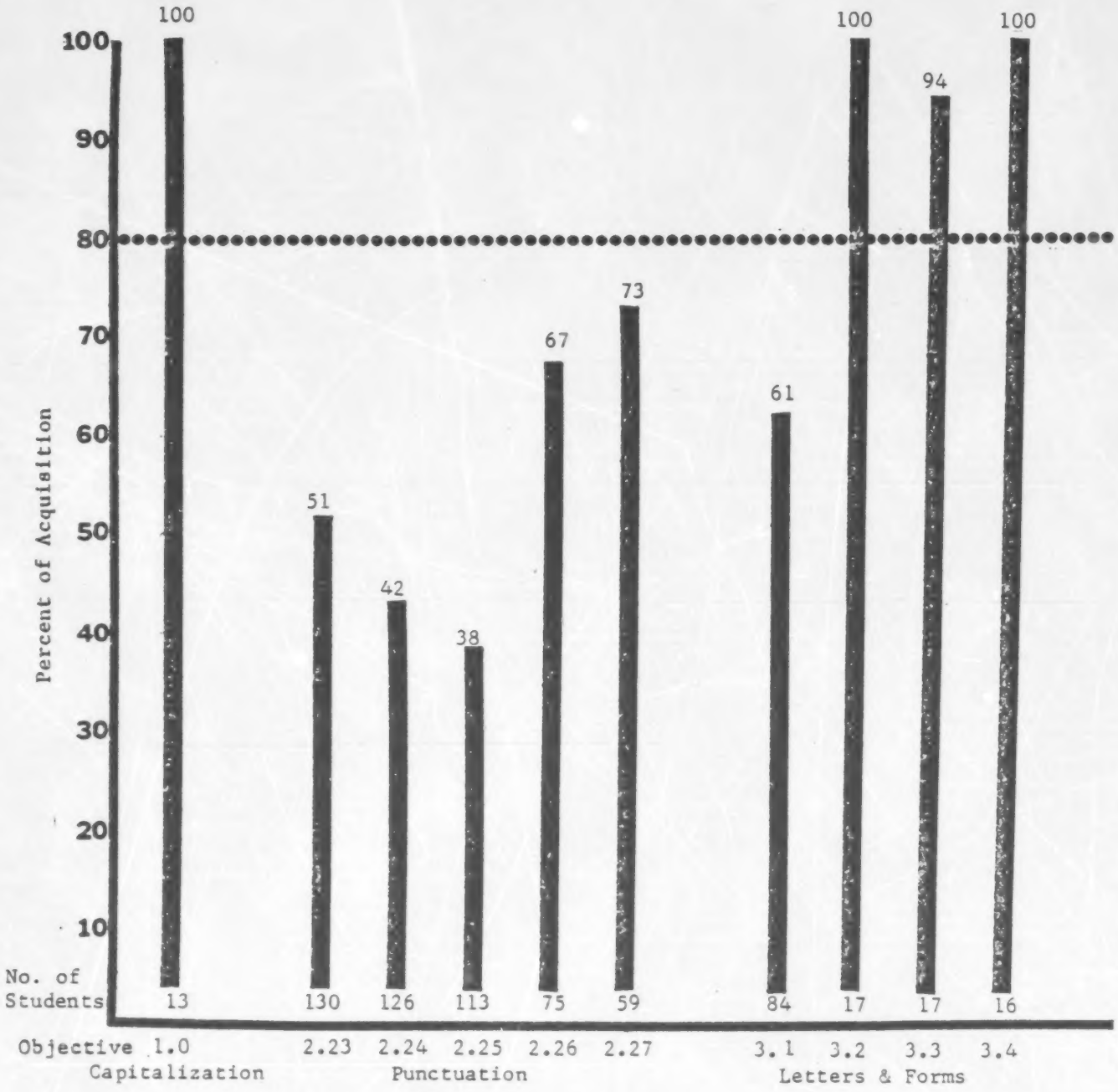


FIGURE III-20

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL SEVEN LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

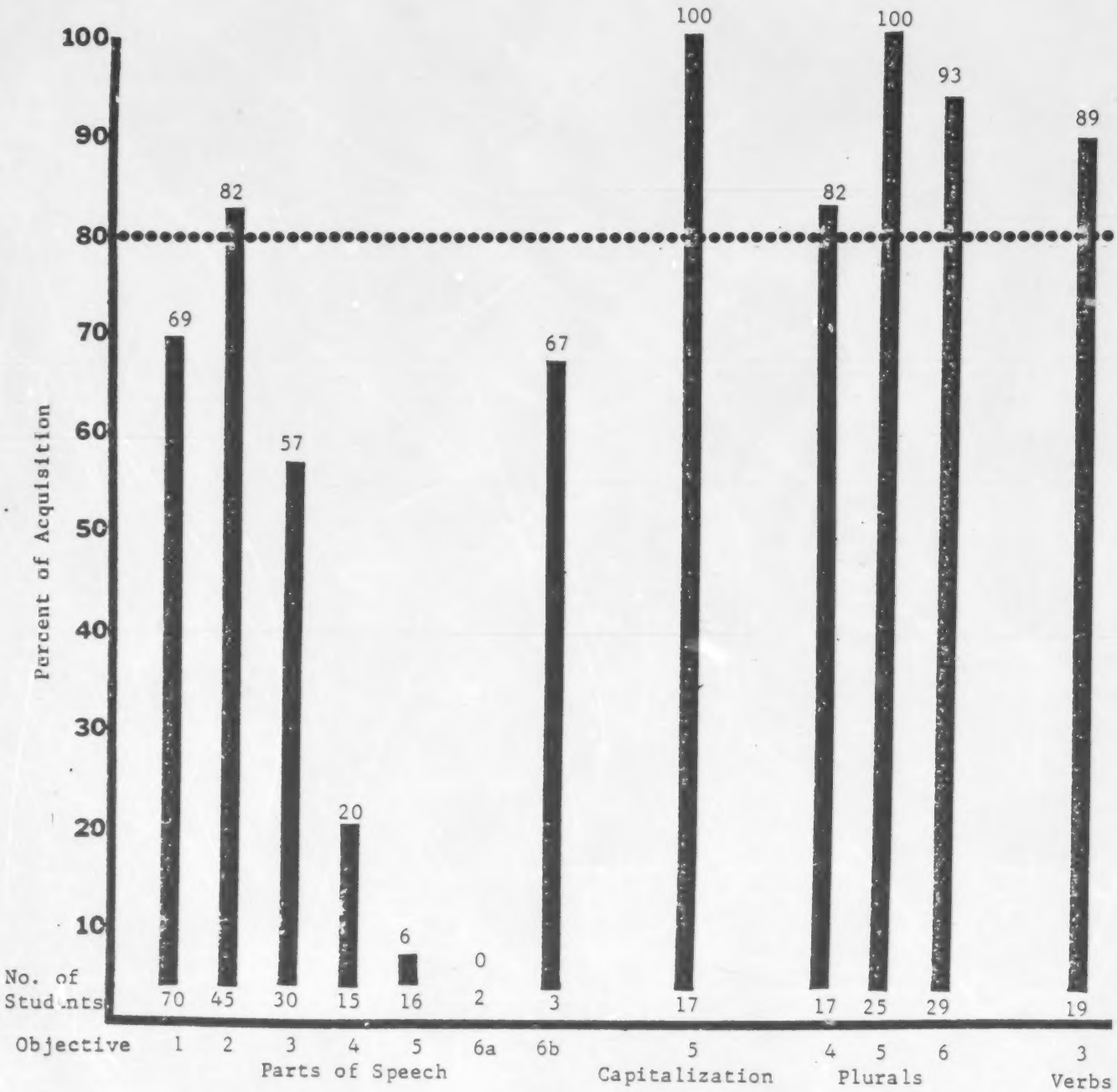


FIGURE III-21

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL EIGHT LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY

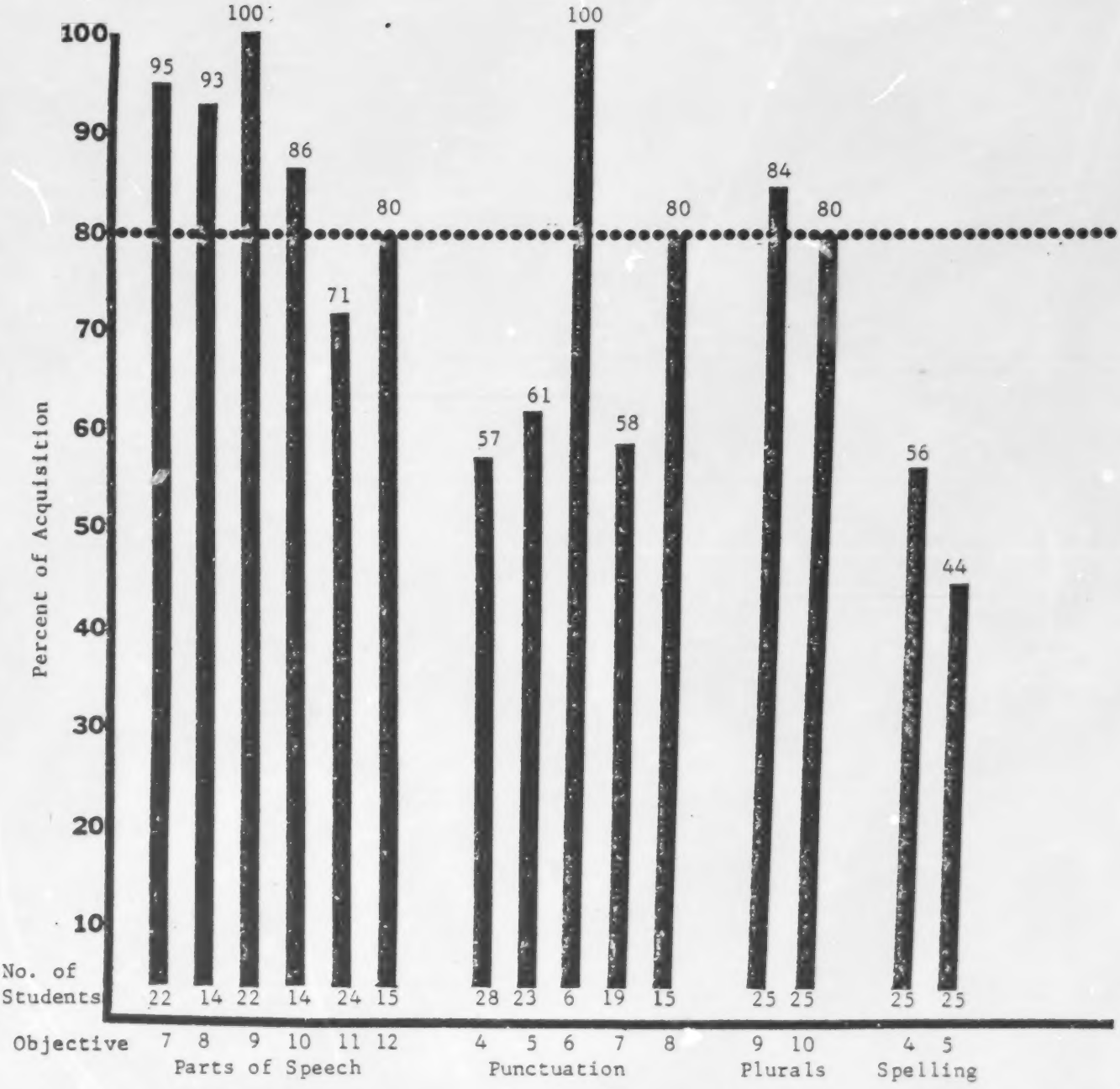
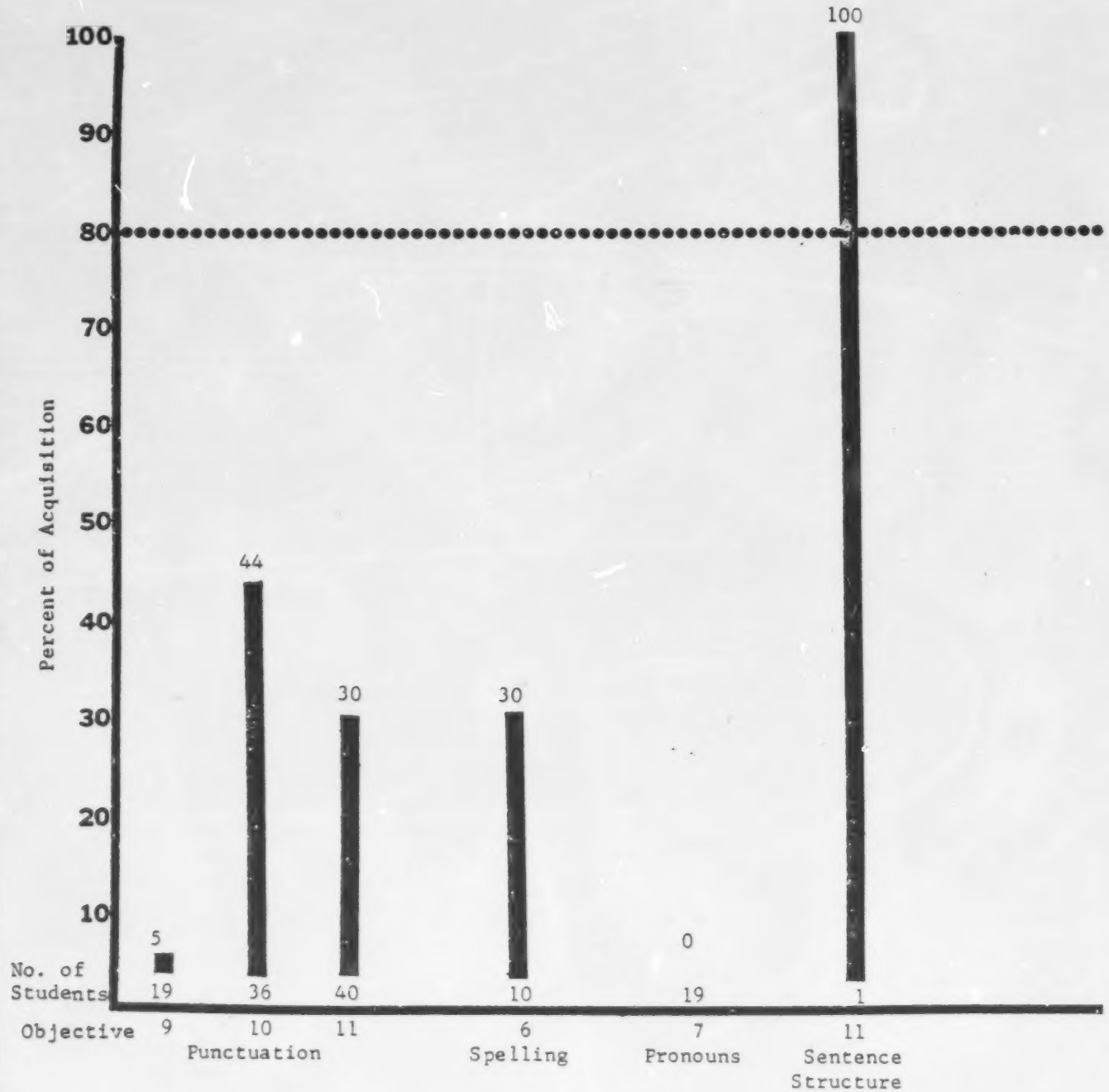


FIGURE III-22

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED LEVEL NINE LANGUAGE ARTS/ENGLISH
OBJECTIVES BY CATEGORY



looked at for performance agreement, clarity, appropriateness, power level, reading complexity, and materials or equipment needed. Next the instructional activities should be examined in the same manner.

Ratings given by teachers (Table D-9, Appendix D) for objective 1.1 reveal a low rating in appropriateness for instructional activity 1 and assessment tasks 1, 2, and 3. Low ratings were also given in clarity for instructional activity 2 and assessment tasks 1, 2, and 3. Objective 1.1 also received low ratings in effectiveness, student interest, student attention, and student attitude.

The mean reading complexity value (SMOG grade, Table E-4, Appendix E) is 3.6 for the instructional activities and 3.5 for the assessment tasks. The mean power levels (Puissance Index, Table F-4, Appendix F) are 6.8, 4.8, and 6.8 for the behavioral objectives, instructional activities, and assessment tasks, respectively, for all level one language arts/English objectives.

Briefly, the additional results are:

- For language arts/English level one (Figure III-14), none of the six objectives was mastered by at least 80 percent of the students.

- For language arts/English level two (Figures III-15), one objective (in punctuation) out of a total of nine objectives was mastered by at least 80 percent of the students. The average SMOG grades for the two instructional activi- and the three assessment tasks were higher for the nonmastered objectives than for the mastered objectives (compare Tables E-3 and E-4, Appendix E). The average Puissance values for the behavioral objective and three assessment tasks for nonmastered objectives were higher than for the mastered objectives (compare Tables F-3 and F-4 in Appendix F).

- For language arts/English level three (Figures III-16), nine of 11 objectives were mastered by at least 80 percent of the students. However, the two objectives not mastered according to the .80 standard were very close to being rated as mastered. Their values were 76 percent acquisition and 78 percent acquisition. The two mean SMOG grades for the nonmastered objectives were higher than the two for the mastered objectives (Appendix E). The average Puissance value for the behavioral objective and the three assessment tasks for the nonmastered objectives were higher than for the mastered objectives (Appendix F).

- For language arts/English level four (Figure III-17), only one objective of a total of 11 objectives exceeded the .80 standard. All mean SMOG grades were higher for the nonmastered objectives than for the mastered objective (Appendix E). The average Puissance value for the behavioral objective was higher for the nonmastered objectives than for the objective analyzed as mastered (Appendix F).

- For language arts/English level five (Figure III-18), one of the seven objectives was mastered by at least 80 percent of the students. The mean SMOG grades for the instructional objectives and the assessment tasks were higher for the objectives not mastered than for the one mastered (Appendix E). The average Puissance values for the behavioral objective, the two instructional activities and the three assessment tasks were higher for the nonmastered objectives than for the objective found to be mastered (Appendix F).

- For language arts/English level six (Figure III-19), six objectives were mastered by at least 80 percent of the students. The mean SMOG grades for the mastered objectives were higher than those for the nonmastered (Appendix E). Only the mean Puissance value for the instructional activities was higher for the nonmastered objectives than for the mastered objectives (Appendix F).

- For language arts/English level seven (Figure III-20), six of 12 objectives were mastered by at least 80 percent of the students. All mean SMOG grades were higher for the nonmastered objectives than for the mastered objectives. The average Puissance values for the behavioral objective and the instructional activities were higher for the nonmastered objectives than for the mastered objectives (Appendix F).

- For language arts/English level eight (Figure III-21), nine of 15 objectives were mastered by at least 80 percent of the students. All mean SMOG grades were rated higher for nonmastered objectives than for the mastered objectives (Appendix E). The three average Puissance values for the nonmastered objectives were lower than the average Puissance values for the mastered objectives (Appendix F).

- For language arts/English level nine (Figure III-22), one of six behavioral objectives was mastered by at least 80 percent of the students. The mean SMOG grade for the three assessment tasks was higher for the objectives not mastered than for the objective mastered (Appendix E). The average Puissance values were higher for the nonmastered objectives than for the one mastered objective (Appendix F).

Accompanying Figures III-14 through III-22, which present the percent of acquisition of language arts/English objectives by level, are Figures G-1 through G-9, which show the percent of acquisition for the same objectives by categories across grades. (Figures G-1 through G-9 are presented in Appendix G.)

G. Summary

The CBC language arts/English and science curricula materials developed by the District of Columbia Schools were validated in 21 elementary and junior high schools during the period 15 November 1977 through 31 March 1978. This period of validation involved approximately 16 weeks of instructional time, excluding holidays.

The total average time devoted to each language arts/English objective ranged from 3.5 hours to 34.3 hours. The median time was 6.1 hours. The total average time devoted to each science objective ranged from 3.5 hours to 32.7 hours. The median time was 5 hours. The total average times for each objective recorded are presented in Tables H-1 through H-4 in Appendix H.

Sixty-nine teachers in this validation study instructed 1,296 students using the CBC approach and newly developed language arts/-English curriculum materials. A total of 87 instructional triads was validated. Thirty-two of the instructional triads did not need revision. Sixty-eight teachers in this validation study instructed 1,588 students using the CBC approach and newly developed science curriculum materials. A total of 97 instructional triads were validated. Fifty-one instructional triads did not need revision.

Data submitted in this report, along with the procedures outlined for analyzing each objective not mastered, will enable curriculum writers to make necessary revisions in the language arts/English and science curriculum materials.

CHAPTER IV. IMPLICATIONS AND CONCLUSIONS

A. The Validation Process

As part of a carefully planned, multiyear effort to implement competency-based curriculum in the Public Schools of the District of Columbia, the Division of Research and Evaluation was assigned the task of validating CBC curriculum materials developed for language arts/English and science in a sample of schools during the 1977-78 school year. The attempt to validate newly developed curriculum materials in a large urban school system was unprecedented; that is, a search of the literature failed to indicate that any comparable endeavor had been undertaken previously. Consequently the Division of Research and Evaluation, with the cooperation of a number of other divisions in the school system, had to develop a conceptual framework for the validation effort as well as to define and undertake all the tasks (e.g., planning for conduct of the effort, instrumentation, sample selection, actual conduct of validation activities, and analysis and reporting of results) required for successful completion of the curriculum validation.

An overriding concern throughout the planning, conduct, and analysis phases of the validation task was that the effort be structured so as to yield practically applicable, as well as conceptually reliable, research results. Hence, during the planning phases particularly close attention was paid to the potential uses of information to be collected. In this context, the study focused on the provision of feedback information to curriculum writing specialists. The information was collected, analyzed, and reported in such a manner as to facilitate its use for making necessary revisions in materials already developed, and for guiding the development of additional materials for use in the D.C. Public Schools. It should be noted that this objective was attained as indicated by the fact that feedback information has been utilized by the curriculum specialists in their ongoing curriculum development efforts.

A second major concern of the Division of Research and Evaluation staff and others involved in the validation was the development of a replicable curriculum validation model which, with minor contextual alterations, could be used widely for curriculum validation in the future. Hence the curriculum validation effort, in addition to meeting the objective of trying out the language arts-/English and science materials in the schools, provided the opportunity to develop and test a workable, replicable curriculum validation model. Based on analysis of this year's effort, the model is, in the judgment of Division of Research and Evaluation staff, now operational and available for others to use in curriculum development, testing, and implementation efforts.

B. Summary of Findings

The CBC language arts/English and science curriculum materials developed by the District of Columbia Schools was validated in 21 elementary and junior high schools during the period 15 November 1977 to 31 March 1978. This period of validation amounted to approximately 16 weeks of instructional time excluding holidays. Sixty-nine teachers instructed 1,296 students using the CBC approach and newly developed language arts materials. Sixty-eight teachers instructed 1,588 students using the CBC approach and newly developed science materials.

As reported in Chapter III, the coefficients of the three criteria--adequacy, consistency, and completeness--and the percentage of acquisition of each objective were used as the basis of revision of the language arts/English and science curriculum materials. Of the approximately 184 instructional triads validated, a substantial number required no revision. For those triad components found to be in need of alteration specifications for modifications were enumerated. In addition, detailed analyses were given for both an instructional triad and an Hypothesis of Learning Dependency in need of revision.

Specific objectives requiring attention in the revision process were identified and communicated to the curriculum developers, who, as noted previously, had already undertaken materials revision activities based on the findings of this study. Suggestions developed through analysis of results included the following:

1. Reading complexity. The application of the SMOG measure in the validation study showed that the level of reading passages was not always appropriate to the reading level of the students for whom the reading material was intended. Therefore, SMOG values should be computed for each instructional triad and HLD in need of revision.
2. Power level. The application of the Puissance measure revealed that the task difficulty level of some components of the instructional triad was not always appropriate for the students who were to complete the task. Therefore, Puissance values should be computed for each instructional triad and HLD in need of revision.
3. Instructional triads. Data compiled from the Teacher Feedback Form and student performance data indicate that instructional activities and assessment tasks were not always in agreement. Therefore, the SMOG and Puissance data should be carefully reviewed for each instructional triad and revisions made accordingly.
4. Sequencing of learning hierarchies. The analysis of the learning hierarchies in the science curriculum showed that revisions in the placement of certain instructional triads in the sequences should be undertaken.

5. Teacher participation. A critical factor in the success of the validation process was the participation and cooperation of the classroom teacher. It became apparent during the conduct of the 1977-78 validation study that it is essential for:

- Data to be submitted according to the validation schedule;
- The identification number of each student to be recorded;
- The objectives reported on the Teacher Feedback Form and the Student Participation Form to be identified by recording the objective number and the page number; and
- Teachers to attend the ongoing staff development sessions for additional explanations and information relative to the validation process.

It is also suggested that curriculum writers use the newly developed objective codes to provide for consistent and sequential numbering in the case of the deletion and/or addition of objectives.

C. Conclusions

Although, as indicated in the previous section, some revision and further development of the validated materials may be required, the general finding of this study, based on the validation results, is that implementation of the competency-based curriculum in the Public Schools of the District of Columbia is feasible. Among other things, the validation study has pointed out that: (1) the CBC materials seem generally to appeal to both students and teachers according to teacher ratings; (2) while the CBC approach provides a useful instructional framework for teachers, it also includes the latitude for the development and implementation of creative approaches to teaching; and (3) by virtue of its structure, the CBC approach provides students with a clear understanding of the behaviors they are expected to acquire. In summary, the CBC materials and approach developed by the school system have the potential to make a substantial impact on the overall improvement of public school education in the District of Columbia.

APPENDIX A

EXEMPLARY CBC MATERIALS

TABLE A-1

CBC LANGUAGE ARTS CURRICULUM

The major goal of the Language Arts curriculum as stated by the curriculum writing team was "to enable the student to demonstrate competence in the communication skills to the degree necessary for the successful attainment of individual life goals." The curriculum team attempted to design their program around this goal and to provide the classroom teacher with measurable performance levels and desired competencies stated as behavioral objectives.

The first draft of the Language Arts curriculum focused on the development of functional writing skills. An example of curriculum materials supplied for one objective is as follows:

Objective: Given several greetings and closings and a model of a friendly letter, the student will capitalize the first word in greetings and closings with 100% accuracy.

INSTRUCTIONAL TASKS	ASSESSMENT TASKS
1. The teacher will present several friendly letter greetings with errors and direct the students to capitalize the first word of each. Items: 1. dear Mother 2. my dear Jane 3. dear friend 4. dear Mr. Smith 5. dear Mrs. Thomas	1. Given several friendly letter greetings and closings with errors, the student will correct each mistake and rewrite them. Items: 1. dear sister 2. my dear Mary 3. yours truly 4. sincerely yours 5. dear friend

TABLE A-1 (continued)

2. The teacher will present several friendly letter closings with errors and direct the students to capitalize the first word of each. Items: 1. your friend 2. sincerely yours 3. yours truly 4. your daughter 5. your son	2. Given a model of a friendly letter with the first words of greetings and closings written in small letters, the student will copy the letter and insert all necessary capitals. Item: Glen Falls, Ohio May 13, 1977 dear mother, Today we played ball at camp. I hit the ball one time and Jack hit the ball two times. We both hit home runs. We are having fun. your son, Danny
	3. The student will write five greetings using two words and five closings using two words and will insert the necessary capital letters for each.

TABLE A-2

CBC SCIENCE CURRICULUM

The elementary sciences hierarchy includes eight seq.ences of objectives arranged in six levels of difficulty. The first three levels are intended for the primary grades and include objectives designed to enable the student to learn the skills of observing, inferring, communicating, measuring, classifying, and using space and time relationships. The three intermediate levels provided include additional opportunities to reinforce and extend basic skills, and provide beginning experiences in the skills areas of formulating hypotheses, identifying and controlling variables, collecting and interpreting data, and experimenting.

An exemplary instructional objective furnished to the classroom teachers for validating the CBC science curriculum at the primary level is as follows:

OBSERVING

After completing the activities, the student will be able to:

Identify the man-made and natural coverings of the earth's surface in the school's environment (concrete walks, grass, rocks, buildings, trees, soil, etc.)

RATIONALE: The earth's surface is covered by many different man-made and natural objects. These objects are a part of our daily environment. This activity will aid in the development of skills in classifying, observing, and oral communication.

MATERIALS NEEDED:
Box or tray, objects collected within the school environment, milk cartons or small boxes.

WHERE TO GET MATERIALS:
School supply.

APPROXIMATE TIME TO TEACH:
Several class periods.

ADVANCE PREPARATION:
Obtain the box or tray on which a school environmental scene will be constructed.

INTRODUCTION: Discuss with the students the meaning of the words man-made and natural. Discuss objects that cover the earth's surface in each area.

TABLE A-2 (continued)

ACTIVITIES:

1. Ask students to name objects that cover the earth's surface. Print the name of each object in one of two columns (without a heading) man-made and natural. After obtaining a sizeable list, ask the students why the name of some objects were placed in one column and others in another. Allow time for discussion. Emphasize again the meaning of man-made and natural.

2. Take a walk within the school environment. Collect man-made and natural objects. Using a box or large tray construct a school environment scene using objects that were collected. Example: soil, rocks, small plants. Trees and buildings can be constructed from cardboard, paper or milk cartons.

ASSESSMENT TASKS:

1. Given paper and pencil, students will identify by drawing three man-made and three natural objects that are found on the earth's surface. This will be done with accuracy.

2. Given an assortment of objects collected on the school yard, students will identify by grouping the objects as man-made and natural with accuracy.

3. Given a list of 10 man-made and natural objects, students will identify them by placing (N) beside all natural objects and (M) beside all man-made objects. The student should be able to mark correctly at least eight objects listed.

APPENDIX B

BRIEF DESCRIPTION OF BEHAVIORAL OBJECTIVES

TABLE B-1

LANGUAGE ARTS/ENGLISH
CAPITALIZATION OBJECTIVES LEVELS 1-6

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
1	1.1	Capitalize the first word in a sentence.
1	1.2	Capitalize proper nouns naming particular pets and persons.
1	1.3	Capitalize the word "I".
2	1.4	Capitalize initials, titles, and abbreviations for proper nouns.
2	1.5	Capitalize the first word in lines of some poetry.
2	1.6	Capitalize proper nouns naming days, months, holidays, and the like.
3	1.7	Capitalize proper nouns naming particular places (streets, towns, cities, states, countries, rural routes, mountains, rivers, lakes, parks, and continents).
3	1.8	Capitalize the first word in greetings and the first word in closing of letters.
4	1.9	Capitalize proper nouns naming buildings, organizations, companies, races, languages, nationalities, and religions.
4	1.10	Capitalize words referring to Deity, to sacred writings, to the Holy Family, and the saints.
5	1.11	Capitalize proper nouns naming historical events.
5	1.12	Capitalize proper adjectives.
5	1.13	Capitalize the first word in a direct quotation.
5(or 6)	1.0	Apply basic rules of capitalization.

TABLE B-2

LANGUAGE ARTS/ENGLISH
PUNCTUATION OBJECTIVES LEVELS 1-6

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
1	2.1	Identify and use a period to follow declarative sentences.
1	2.7	Identify and use a period to follow imperative sentences.
2	2.2	Identify and use a period to follow abbreviations and initials.
2	2.3	Identify and use a question mark to follow an interrogative sentence.
2	2.4	Identify and use an apostrophe to show possession.
2	2.5	Identify and use an apostrophe to replace letters omitted in a contraction.
2	2.6	Identify and use a comma in dates.
3	2.9	Identify and use a comma after the greeting and closing of a friendly letter.
3	2.10	Identify and use a comma in addresses.
3	2.11	Identify and use a comma in a series of single words and phrases.
3.	2.12	Identify and use a comma to separate 'too', meaning also, from the rest of the sentence.
4	2.8	Identify and use an exclamation mark to follow exclamatory sentences.
4	2.13	Identify and use an exclamation mark to follow a strong interjection.
4	2.14	Identify and use a comma to set off a name in direct address from the rest of the sentence.
4	2.15	Identify and use a colon after the greeting of a business letter.
4	2.16	Identify and use a colon to introduce a list.
4	2.17a	Distinguish between direct and indirect quotations.
4	2.17	Identify and use quotation marks around direct quotations.
8	2.18	Identify and use quotation marks around written conversation.

TABLE B-2 (continued)

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
5	2.19	Apply the rules for underlining the titles of books, periodicals, works of art, motion pictures, ships, documents, and lengthy compositions.
5	2.20	Identify and use a comma with quotations.
5	2.21	Identify and use a comma with coordinating conjunctions linking two parts of a compound sentence.
5	2.22	Identify and use a comma after mild interjections occurring at the beginning of a sentence.
6	2.23	Identify and use a hyphen to divide a word correctly at the end of a line.
6	2.24	Identify and use a hyphen to separate parts of some compound words.
6	2.25	Identify and use a comma to set off words used as appositives from the rest of the sentence.
6	2.26	Identify and use a comma to separate parenthetical expressions from the rest of the sentence.
6	2.27	Identify and use quotation marks around titles of poems, short stories, songs, and articles.
6	2.0	Apply basic rules of punctuation.

TABLE B-3

LANGUAGE ARTS/ENGLISH
SENTENCE STRUCTURE OBJECTIVES LEVELS 1-6

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
1	1.1	Make distinct patterns.
1	1.2	Identify letters of the alphabet.
2	1.3	Order letters to make words.
2	1.5	Expand vocabulary using new words.
2	1.6	Formulate ideas for writing.
3	1.1a	Produce visually distinct patterns.
3	1.4	Construct picture/writing dictionary.
3	1.7	Order words to make sentences.
3	1.11	Proof-read written work and make corrections.
3	2.1	Recognize and order ideas and principles in logical form for writing.
4	1.8	Distinguish basic sentences from fragments and run-on sentences.
4	1.9	Expand sentences.
4	1.10	Identify and use the four kinds of sentences.
4	2.2	Identify the need for a topic sentence.
4	2.3	State reasons as proof in developing a topic sentence.
4	2.4	Identify paragraph design and structure.
4	2.5	Construct a paragraph using topic, supporting and concluding sentences.
4	2.6	Use an outline for developing paragraphs.
4	2.7	Construct written materials such as compositions, reports, articles, and class newspapers.
4(or 6)	1.0	Communicate in complete sentences.
4(or 6)	2.0	Organize ideas effectively in writing.

TABLE B-4

LANGUAGE ARTS/ENGLISH
LETTERS/FORMS OBJECTIVES LEVEL 6

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
6	3.1	Write social letters.
6	3.2	Write business letters.
6	3.3	Write postcards.
6	3.4	Fill in forms (variety).
6	1.0	Construct friendly, social, and business letters, envelopes, and postcards.
6	3.0	Fill in forms (coupons, applications, etc.)

TABLE B-5

LANGUAGE ARTS/ENGLISH
PARTS OF SPEECH AND CAPITALIZATION OBJECTIVES LEVELS 7-8

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
	Parts of Speech	
7	1	Distinguish among nouns, verbs, and adverbs by characteristic form.
7	2	Identify the structure words (determiners, auxiliary verbs, intensifier adverbs).
7	3	Distinguish among nouns, verbs, adjectives, and adverbs, by their position in a sentence.
7	4	Distinguish among parts of speech according to function and meaning.
7	5	Distinguish among parts of speech based upon grammatical characteristics.
7	6a	Apply the rules governing the comparative and superlative forms of adjectives and adverbs.
7	6b	Distinguish among the degrees.
8	7	Distinguish among the classes and subclasses of nouns.
8	8	Distinguish between the types and uses of prepositional phrases.
8	9	Identify verb phrases and distinguish among auxiliary verbs, main verbs, and linking verbs.
8	10	Distinguish among the classes of pronouns and the subclasses of personal pronouns.
8	11	Distinguish among the classes and use of conjunctions.
8	12	Distinguish among the classes and subclasses of parts of speech.
	Capitalization	
7	5	Apply the rule for capitalizing numbers which are names of streets.
7	8	Apply the rule for capitalizing compass-point words.
7	9	Apply generally accepted rules for the use of capital letters.

TABLE B-6

LANGUAGE ARTS/ENGLISH
PUNCTUATION OBJECTIVES LEVELS 7-9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
7	1	State the rules governing the use of the period, question mark, exclamation mark, comma, apostrophe, colon, quotation mark, hyphen, and underlining mark.
7	2	Apply the rules governing the use of the period, question mark, exclamation mark, comma, apostrophe, colon, quotation mark, hyphen, and underlining mark.
7	3	Demonstrate mastery of the ability to write conversation correctly.
8	4	Identify the semicolon, bracket, parenthesis, dash, caret, and single quotation mark.
8	5	State the rules for the semicolon, bracket, parenthesis, dash, caret, and single quotation mark.
8	6	Apply the rules governing these punctuation marks: semicolon, bracket, parenthesis, dash, caret, and single quotation mark.
8	7	State the rules governing the less common uses of the period, question mark, comma, apostrophe, colon, and hyphen.
8	8	Apply the rules governing the less common uses of the period, question mark, comma, apostrophe, colon, and hyphen.
9	9	Demonstrate the proper use of the comma with nonessential phrases and clauses.
9	10	Apply the rules governing these punctuation marks: periods, question marks, exclamation marks, commas, apostrophes, colons, quotation marks, carets, and parentheses.
9	11	Demonstrate mastery of the correct use of a variety of punctuation marks in written expression.

TABLE B-7

LANGUAGE ARTS/ENGLISH
PLURALS AND SPELLING OBJECTIVES LEVELS 7-9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
	Plurals	
7	4	Identify collective nouns in context as being singular or plural.
7	5	Identify the correct predicate to use with nouns which have the same singular form as the plural form.
7	6	Use plural predicates with nouns which are always plural.
7	7	Use singular predicates with nouns which are plural in form but singular in meaning.
7	8	Make the principal part of a compound word plural or in the case of a few, make each part of the compound noun plural.
8	9	Apply the rules governing the singular and plural forms of selected foreign words.
8	10	Apply Standard English rules governing the singular and plural forms.
	Spelling	
7	1	Spell selected words from Dolch basic word list.
7	2	Spell selected words governed by the silent "e".
7	3	Spell selected words in which the final consonent must be doubled.
8	4	Spell selected words governed by the final "y" rule.
8	5	Spell selected words governed by the "ie" and "ei" rules.
9	6	Spell selected words governed by the rules for adding prefixes.
9	7	Spell a list of words often confused.
9	8	Spell selected words from the junior high school demons list.
9	9	Spell selected words from various junior high school spelling lists.

TABLE B-8

LANGUAGE ARTS/ENGLISH

VERB USAGE, SUBJECT-VERB AGREEMENT, AND PRONOUN CASE OBJECTIVES LEVELS 7-9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
	Verb Usage	
7	1	Apply the rules for use of the four principal parts of regular and irregular verbs.
7	2	Apply the rules governing the tenses and appropriate verb forms (conjugation).
7	3	Apply the rules governing the use of the troublesome verbs: lie and lay, rise and raise, sit and set.
	Subject-Verb Agreement	
7	1	Apply the rule that compound subjects may take either singular or a plural verb.
8	2	Make indefinite pronouns as subjects agree with verbs.
8	3	Demonstrate that subjects plural in form but singular in meaning require a singular verb.
8	4	Demonstrate that subject and complement of different number do not agree.
8	5	Apply the rule that the number of the subject is not changed by intervening phrases before the verb.
8	6	Identify the correct verb to agree with the relative pronoun in the adjective clause.
8	7	Apply the rule that subjects and verbs agree in person and number.
	Pronoun Case	
7	1	Demonstrate the use of personal pronouns in the nominative case.
7	2	Demonstrate the use of the objective case of personal pronouns.
7	3	Demonstrate the use of the possessive case of personal pronouns.
7	4	Apply the rule of avoiding double subjects.
8	5	Demonstrate the use of the nominative and objective cases of pronouns in incomplete construction.
8	6	Apply the rules of case to the interrogative and relative pronouns: who, whom, whose.
9	7	Apply the rules of pronoun case usage.

TABLE B-9

LANCUAGE ARTS/ENGLISH
SENTENCE STRUCTURE OBJECTIVES LEVELS 7-9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DISCRIPTION
7	Entry	Construct a vocabulary notebook of frequently confused words, their definitions, and sentences illustrating usage.
7	1	Identify errors and construct new sentences substituting specific or concrete words for general or abstract ones.
7	2	Locate idioms and construct sentences that avoid faulty or ambiguous idiomatic uses.
7	3	Identify errors and construct new sentences through revisions to improve upon ambiguous or vague relationships expressed by conjunctions or prepositions.
7	4	Identify errors and construct new sentences to correct trite expressions.
7	5	Apply specific or "strangly" verbs.
7	6	Construct new sentences to substitute a more active construction using the same verb.
7	7	Construct original, precise and effective sentences.
8	8	Construct sentences with more vivid images.
8	9	Identify sentences as: SV, SVO, SLVN, SLV adj, SVIOO.
8	10	Construct two sentences for each of the five basic sentence patterns.
9	11	Identify sentences containing phrases as appositive or verbal phrases.
9	12	Construct sentences containing verbal or appositive phrases.
9	13	Identify clauses as adjective or adverb.
9	14	Construct complex sentences by adding adjective and adverb clauses.
9	15	Describe the kind of sentences as simple, compound, or complex.
9	16	Construct sentences incorporating a variety of sentence structures.
9	17	Construct sentences using a variety of sentence patterns and sentence structures.

TABLE B-10

LANGUAGE ARTS/ENGLISH
PARAGRAPHS OBJECTIVES LEVELS 7&9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
7	1	Head papers correctly and begin writing on the third line.
7	2	Follow prescribed format in preparing written work.
7	3	Incorporate in written assignment the standard format.
7	4	Limit the topic by naming a limiting main idea of the topic.
7	5	Construct a concise topic sentence.
7	6	Construct supporting sentencesto develop the main idea.
7	7	Construct a paragraph according to time order, position order, or order of importance.
7	8	Construct a paragraph containing apporpriate transitional expressions.
7	9	Construct a concluding sentence.
9	10	Construct a paragraph that creates an impression.
9	11	Construct a paragraph by example to answer a question.
9	12	Construct a paragraph by definition.
9	13	Construct a paragraph which states and supports an opinion.
9	14	Construct a unified, coherent paragraph applying the element of a good paragraph development.

TABLE B-11

LANGUAGE ARTS/ENGLISH COMPOSITION, FORMS, AND LETTERS OBJECTIVES LEVELS 7&9

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
	Composition	
7	1	Select and limit the subject.
7	2	Apply the rules governing the mechanics of constructing an outline.
7	3	Generate and organize thoughts into outline form.
7	4	Construct an outline appropriate for a short paper on a topic.
7	5	Introduce and develop the main idea of the composition.
7	6	Construct a conclusion to a composition.
7	7	Proofread, make corrections and revisions, and write the final draft.
7	8	Construct a unified, coherent, clear, and brief composition of no fewer than three paragraphs.
	Forms	
7	2	Interpret functions of and terms of various forms.
9	3	Complete different types of application forms.
9	4	Complete an order blank in a catalog correctly.
9	5	Fill in requested information accurately on a personal check, a money order, and stubs.
9	6	Prepare a U.S. Individual Income Tax Return (short form 1040A).
9	7	Complete a variety of personal and business forms using the specialized vocabulary to aid in giving the information requested.
	Letters	
7	1	Apply rules for writing friendly letters and addressing envelopes.
7	2	Construct a friendly letter and address envelope.
7	3	Apply rules for business letter.
7	4	Construct a business letter of request and address envelope.
7	5	Construct friendly and business letters and address envelopes.

TABLE B-12

SCIENCE
OBSERVING OBJECTIVES LEVEL 1

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
1	1	Name and identify the sense organs.
1	2	Identify and describe the use of the five sense organs.
1	3	Identify sense organs as tools of observation.
1	4	Name and identify the physical property of color.
1	5	Identify the physical property of size.
1	6	Name and identify the physical property of shape.
1	7	Name and identify the physical property of texture.
1	8	Describe objectives by using at least three properties.
1	9	Distinguish between living and non-living things.
1	10	Identify plants and animals as living things.
1	11	Distinguish between plants and animals.
1	12	Identify and name the parts of a plant.
1	13	Identify at least three different vegetable foods.
1	14	Identify ways in which animals move.
1	15	Identify body coverings of animals.
1	16	Identify 300 farm and forest animals.
1	17	Identify animals as the source of three different foods
1	18	Deleted
1	19	Demonstrate that the direction of a force can be determined.
1	20	Demonstrate and observe how machines (toys) move.
1	21	Identify and distinguish between the night sky and the day sky.
1	22	Describe the characteristics of a given day.
1	23	Identify the seasons.

TABLE B-13

SCIENCE
OBSERVING OBJECTIVES LEVEL 2

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
2	24	Describe the relationship of an object and its shadow.
2	25	Report observations of the moon.
2	26	Identify substances as solids, liquids, or gases.
2	27	Identify a magnet and describe its properties.
2	28	Distinguish between objects as magnetic and non-magnetic.
2	29	Identify the man-made and natural objects.
2	30	Describe objects in the environment.
2	31	Identify three ways in which living things protect themselves.
2	32	Describe three requirements for plant growth.
2	33	Describe the observable changes in plants.
2	34	Identify three life functions of living things.

TABLE B-14

SCIENCE
OBSERVING OBJECTIVE LEVELS 3-4

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
3	35	Describe or demonstrate that objects expand.
3	36	Identify evidence that supports the presence of physical changes.
3	37	Identify the center, North, South, East and West directions.
3	38	Distinguish the N.E., S.E., N.W. and S.W. sections of the city.
3	39	Identify at least two major reservoirs of D.C. and their source.
3	40	Name and identify vertebrate and invertebrate animals.
3	41	Identify the interdependence of plants and animals.
4	42	Describe how sound is produced by vibration.
4	43	Demonstrate the relationship between the role of vibration and pitch.
4	44	Identify the properties and two component parts of a solution.
4	45	Identify crystals by their observable properties.
4	46	Describe observations of the interrelationships of organisms.
4	47	Describe the interactions of a population of fruit flies.

TABLE B-15

SCIENCE
OBSERVING OBJECTIVE LEVELS 5-6

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
5	48	Identify at least three instruments used to measure conditions of weather.
5	49	Identify the units used for measuring wind speed, temperature, air pressure, and humidity.
5	50	Identify at least four symbols from a simple weather map.
5	51	Demonstrate static electricity.
5	52	Distinguish materials as "conductors" or "non-conductors" of electricity.
5	53	Identify and construct simple, parallel, and series circuits.
5	54	Identify and demonstrate that electricity changes to heat and light when meeting resistance.
5	55	Distinguish at least six simple and complex machines.
5	56	Identify the six simple machines.
5	57	Describe how commonly used objects act as simple machines.
5	58	Demonstrate how simple machines can change the direction of a force and perform work.
5	59	Identify plants without seeds.
5	60	Identify the different stages in the life cycle of the mealworm.
5	61	Identify variations in organisms.
6	62	Demonstrate and describe how light travels in a straight path.
6	63	Identify materials as transparent, translucent or opaque.
6	64	Demonstrate and describe the apparent bending of light rays.

TABLE B-16

SCIENCE AND SUPERSTITION OBJECTIVES LEVEL 7

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
7	1	Name 10 fields of science.
7	2	Name 10 fields of science that provide occupational opportunities.
7	3	Describe 5 ways in which science has improved his life.
7	4	Describe the basis for a superstition.
7	5	Describe the word science with the definition.
7	6	Order the stages of an experiment.
7	7	Construct a hypothesis.
7	8	Construct conclusions.
7	9	Distinguish between advertising propaganda and scientific evidence.
7	10	Distinguish between science and superstition.

TABLE B-17

SCIENCE
LABORATORY TECHNIQUES LEVEL 7

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
7	11	Construct a definition of matter.
7	12	Demonstrate using diffusion and compression procedures that a gas has neither a size or specific shape of its own.
7	13	Collect and order the data into an appropriate sequence.
7	14	State a plausible hypothesis to explain the causes or probable results of a given set of conditions.
7	15	Describe a solid as having a definite size and shape.
7	16	Demonstrate that a liquid has a definite size but takes the shape of its container.
7	17	Distinguish the physical from the chemical properties of a given substance.
7	18	Describe the effects of temperature on solubility of a solid.
7	19	Identify the variables which could influence the results of an experiment.
7	20	Identify the manipulated variable and controlled variables.
7	21	Identify the names and symbols of at least 20 elements.
7	22	Identify the atomic weight, symbol, number of energy shells, and the number of electrons on the outside shell of an atom of an element.
7	23	Construct a model of the electron structure of the atom.
7	24	Construct a model of a compound.
7	25	Identify materials which are man-made.
7	26	Identify at least three physical changes.
7	27	Identify at least two chemical changes.
7	28	Distinguish compounds from mixtures.
7	29	Classify given matter as an element, compound or mixture.
7	30	Apply an experimental model to identify an element.
7	31	Demonstrate the ability to use laboratory material and equipment.

TABLE B-18

SCIENCE
MATTER OBJECTIVES LEVEL 7

GRADE LEVEL	OBJECTIVE NUMBER	BRIEF DESCRIPTION
7	32	Describe the characteristics of matter.
7	33	Describe substances as being solids, liquids, or gases.
7	34	Define the process of sublimation.
7	35	Describe the observable physical properties of objects.
7	36	Demonstrate the ability to measure the volume of a liquid.
7	37	Describe density.
7	38	Demonstrate the ability to find the density of a solid object.
7	39	Describe Archimedes' principle.
7	40	Describe density and buoyancy.
7	41	Distinguish between elements, compounds, and mixtures.
7	42	Describe the use of symbols and formulas.
7	43	Describe the relationship between elements and compounds.
7	44	Describe the number, ordering, and grouping of elements on the periodic chart.
7	45	Distinguish matter as being elements, compounds or mixtures.
7	46	Identify components of the particle theory of matter.
7	47	Apply the molecular theory of matter.
7	48	Identify characteristics of molecules and atoms.
7	49	Describe the law of definite proportions.
7	50	Construct a diagram of an atom.
7	51	Describe physical changes in matter.
7	52	Describe and identify physical and chemical changes.
7	53	Distinguish and describe potential and kinetic energy.
7	54	Describe and write the equation which represents a given chemical change.
7	55	Describe oxidation.
7	56	Apply the law of conservation.
7	57	Describe the chemical change photosynthesis.
7	58	Describe the relationships between matter and energy.

APPENDIX C

ASSESSMENT TASK RESULTS

TABLE C-1

ASSESSMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE SCIENCE OBSERVING
OBJECTIVES IN NEED OF REVISION

		Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	Level	A.T. 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
1	1	78%	2%	8%	0%	5%	0%	2%	3%
2	1	56%	9%	15%	4%	3%	1%	1%	12%
3	1	72%	16%	4%	3%	1%	0%	0%	3%
6	1	79%	0%	4%	0%	3%	2%	3%	9%
7	1	67%	5%	9%	2%	5%	2%	4%	6%
9	1	77%	3%	0%	1%	6%	6%	1%	6%
13	1	78%	0%	3%	0%	16%	0%	0%	3%
22	1	36%	16%	12%	8%	8%	0%	8%	12%
24	2	74%	3%	4%	4%	8%	1%	1%	5%
26	2	78%	2%	5%	3%	8%	2%	2%	1%
27	2	75%	3%	12%	0%	5%	0%	3%	0%
28	2	76%	6%	6%	1%	5%	2%	1%	2%
29	2	63%	5%	6%	4%	8%	1%	5%	8%
30	2	72%	6%	6%	3%	6%	2%	2%	3%
31	2	71%	11%	10%	5%	2%	0%	1%	1%
32	2	80%	12%	2%	1%	1%	1%	2%	0%
33	2	61%	5%	4%	2%	3%	0%	24%	2%
35	3	65%	17%	9%	3%	3%	2%	0%	2%
36	3	56%	6%	20%	3%	6%	3%	3%	2%
38	3	60%	8%	11%	5%	6%	3%	7%	0%
39	3	75%	0%	15%	0%	7%	0%	3%	0%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

TABLE C-2

ASSESSMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE SCIENCE OBSERVING
OBJECTIVES IN NEED OF REVISION

		Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	Level	A.T. 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
42	4	60%	9%	9%	5%	6%	3%	3%	6%
43	4	51%	4%	11%	2%	20%	2%	3%	7%
44	4	65%	9%	5%	3%	2%	3%	3%	11%
45	4	70%	6%	10%	0%	3%	3%	3%	5%
46	4	66%	10%	7%	2%	2%	2%	5%	8%
47	4	79%	2%	2%	0%		9%	0%	4%
48	5	60%	4%	10%	10%	1%	1%	7%	6%
49	5	31%	17%	25%	7%	3%	0%	7%	11%
50	5	72%	6%	9%	5%	2%	3%	1%	3%
51	5	51%	31%	0%	0%	12%	6%	0%	0%
52	5	50%	18%	7%	7%	14%	0%	4%	0%
53	5	50%	8%	33%	8%	0%	0%	0%	0%
54	5	0%	0%	0%	0%	50%	0%	30%	20%
55	5	11%	0%	11%	0%	34%	3%	32%	11%
56	5	39%	14%	4%	17%	3%	4%	6%	12%
57	5	10%	8%	0%	5%	10%	28%	8%	33%
58	5	58%	29%	5%	0%	3%	5%	0%	0%
63	6	75%	2%	9%	2%	2%	0%	2%	7%
64	6	72%	4%	5%	11%	2%	1%	2%	2%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

TABLE C-3

ASSESSMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE SCIENCE
OBJECTIVES IN NEED OF REVISION

	Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	A.T. 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
Superstition								
1	64%	2%	8%	2%	4%	2%	4%	13%
2	78%	8%	2%	4%	1%	1%	1%	6%
3	79%	4%	1%	2%	3%	1%	2%	8%
5	76%	1%	1%	1%	4%	2%	2%	13%
8	88%	6%	0%	1%	0%	1%	0%	5%
Laboratory Techniques								
20	74%	2%	11%	8%	2%	0%	2%	3%
21	70%	1%	3%	26%	0%	0%	0%	0%
26	84%	5%	11%	0%	0%	0%	0%	0%
27	100%	0%	0%	0%	0%	0%	0%	0%
Matter								
35	100%	0%	0%	0%	0%	0%	0%	0%
36	59%	19%	15%	0%	7%	0%	0%	0%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

TABLE C-4

ASSESSEMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE LANGUAGE ARTS/ENGLISH CAPITALIZATION
OBJECTIVES IN NEED OF REVISION

		Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	Level	A.T 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
1.1	1	63%	9%	6%	8%	1%	2%	0%	11%
1.2	1	65%	3%	10%	6%	10%	0%	2%	4%
1.3	1	76%	11%	1%	2%	1%	4%	0%	4%
1.4	2	23%	2%	2%	2%	15%	21%	11%	25%
1.5	2	37%	2%	29%	15%	2%	2%	5%	10%
1.6	2	48%	17%	7%	18%	2%	0%	0%	7%
1.7	3	76%	9%	1%	8%	2%	0%	0%	5%
1.9	4	57%	3%	5%	7%	8%	0%	3%	15%
1.10	4	62%	10%	10%	2%	3%	3%	3%	7%
1.11	5	70%	11%	3%	2%	2%	8%	1%	4%
1.12	5	55%	12%	6%	5%	3%	4%	4%	11%
1.13	5	15%	4%	13%	10%	5%	12%	4%	37%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

TABLE C-5

ASSESSMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE LANGUAGE ARTS/ENGLISH PUNCTUATION
OBJECTIVES IN NEED OF REVISION

Behavioral Objective	Level	Results of Each of the Combinations of Assessment Tasks							
		A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3	A.T. 1 2 3
		+ + +	+ + -	+ - +	+ - -	- + +	- + -	- - +	- - -
2.1	1	59%	19%	5%	11%	1%	0%	2%	3%
2.7	1	48%	13%	22%	13%	2%	0%	0%	3%
2.2	2	66%	3%	6%	2%	10%	3%	6%	3%
2.3	2	57%	3%	5%	3%	4%	1%	2%	25%
2.4	2	25%	3%	31%	39%	3%	0%	0%	0%
2.5	2	78%	1%	4%	1%	11%	0%	2%	2%
2.8	4	65%	6%	29%	0%	0%	0%	0%	0%
2.13	4	49%	16%	2%	2%	2%	7%	0%	21%
2.14	4	58%	0%	33%	0%	3%	0%	0%	6%
2.15	4	55%	0%	5%	0%	5%	15%	0%	20%
2.16	4	53%	26%	5%	11%	0%	5%	0%	0%
2.18	4	63%	5%	11%	5%	5%	0%	5%	5%
2.19	5	62%	1%	6%	1%	1%	0%	0%	28%
2.20	5	37%	5%	8%	6%	7%	5%	10%	22%
2.21	5	75%	1%	9%	1%	7%	2%	0%	6%
2.23	6	51%	13%	3%	2%	3%	18%	2%	8%
2.24	6	42%	22%	2%	4%	5%	16%	0%	10%
2.25	6	38%	0%	16%	4%	3%	8%	15%	16%
2.26	6	67%	3%	8%	1%	8%	0%	9%	4%
2.27	6	73%	7%	3%	3%	2%	5%	2%	5%
4	8	57%	0%	11%	25%	0%	0%	0%	7%
5	8	61%	13%	0%	13%	0%	0%	0%	13%
7	8	58%	26%	5%	11%	0%	0%	0%	0%
9	9	5%	0%	0%	89%	0%	0%	0%	5%
10	9	44%	6%	17%	17%	0%	0%	0%	17%
11	9	30%	10%	15%	25%	0%	3%	0%	18%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

TABLE C-6

ASSESSMENT TASK RESULTS BY PERCENT
OF STUDENTS SUCCESSFULLY COMPLETING EACH
FOR THOSE LANGUAGE ARTS/ENGLISH LETTERS AND FORMS,
PRONOUNS, SPELLING, PARTS OF SPEECH, AND SENTENCE STRUCTURE
OBJECTIVES IN NEED OF REVISION

		Results of Each of the Combinations of Assessment Tasks							
Behavioral Objective	Level	A.T. 1 2 3 + + +	A.T. 1 2 3 + + -	A.T. 1 2 3 + - +	A.T. 1 2 3 + - -	A.T. 1 2 3 - + +	A.T. 1 2 3 - + -	A.T. 1 2 3 - - +	A.T. 1 2 3 - - -
Letters and Forms									
3.1	6	61%	6%	1%	4%	4%	2%	1%	21%
Pronouns									
7	9	0%	0%	0%	0%	0%	0%	42%	58%
Spelling									
4	8	56%	8%	4%	20%	0%	4%	0%	8%
5	8	44%	0%	0%	32%	0%	4%	0%	20%
6	9	30%	20%	0%	20%	0%	0%	0%	20%
Parts of Speech									
1	7	69%	9%	11%	8%	0%	0%	0%	3%
3	7	57%	0%	0%	3%	7%	0%	3%	30%
4	7	20%	40%	0%	33%	0%	0%	0%	7%
5	7	6%	0%	44%	25%	0%	25%	0%	0%
6a	7	0%	0%	0%	100%	0%	0%	0%	0%
6b	7	67%	33%	0%	0%	0%	0%	0%	0%
11	8	71%	0%	0%	0%	29%	0%	0%	0%
Sentence Structure									
1.1	1	73%	0%	0%	0%	0%	0%	0%	27%
1.3	2	38%	44%	0%	0%	0%	19%	0%	0%
1.1a	3	78%	3%	15%	3%	0%	0%	0%	1%
1.9	4	63%	0%	21%	0%	11%	0%	0%	5%
1.10	4	39%	33%	16%	11%	0%	[illegible]%	0%	0%

"+" indicates an assessment task Successfully completed.

"-" indicates an assessment task Not successfully completed.

APPENDIX D

TEACHER RATINGS

TABLE D-1

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 1 Objectives							
Areas Rated	1	2	3	6	7	9	13	22
Appropriateness								
B.O.								
I.A. 1								
I.A. 2								
A.T. 1					X			
A.T. 2								
A.T. 3								
Clarity								
B.O.								
I.A. 1		X						
I.A. 2								
A.T. 1					X			
A.T. 2		X						
A.T. 3		X						
Effectiveness								
Student Interest								
Student Attention								
Student Attitude								
Teacher Attitude								

*An "X" indicates a low rating.

TABLE D-2

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 2 Objectives							
Areas Rated	24	26	27	28	29	30	31	33
Appropriateness								
B.O.								
I.A. 1								
I.A. 2					X			
A.T. 1								
A.T. 2					X			
A.T. 3								
Clarity								
B.O.								
I.A. 1								
I.A. 2								
A.T. 1								
A.T. 2					X			
A.T. 3								
Effectiveness								
Student Interest								
Student Attention								
Student Attitude								
Teacher Attitude								

*An "X" indicates a low rating.

TABLE D-3

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 3 Objectives			
Areas Rated	35	36	38	39
Appropriateness				
B.O.				
I.A. 1		X		
I.A. 2				X
A.T. 1				X
A.T. 2		X		
A.T. 3				
Clarity				
B.O.				
I.A. 1				
I.A. 2				
A.T. 1				
A.T. 2		X		
A.T. 3				
Effectiveness		X		
Student Interest				
Student Attention				
Student Attitude				
Teacher Attitude				

*An "X" indicates a low rating.

TABLE D-4

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 4 Objectives					
Areas Rated	42	43	44	45	46	47
Appropriateness						
B.O.						
I.A. 1						
I.A. 2						
A.T. 1						
A.T. 2	X		X			
A.T. 3						
Clarity						
B.O.						
I.A. 1						
I.A. 2						
A.T. 1						
A.T. 2	X					
A.T. 3						
Effectiveness	X					
Student Interest						
Student Attention						
Student Attitude						
Teacher Attitude						

*An "X" indicates a low rating.

TABLE D-5

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 5 Objectives										
Areas Rated	48	49	50	51	52	53	54	55	56	57	58
Appropriateness											
B.O.								X			
I.A. 1											
I.A. 2											
A.T. 1								X			
A.T. 2								X			
A.T. 3											
Clarity											
B.O.				X				X			
I.A. 1											X
I.A. 2											X
A.T. 1							X	X			X
A.T. 2							X				X
A.T. 3							X			X	X
Effectiveness		X		X			X	X			X
Student Interest											
Student Attention											
Student Attitude											
Teacher Attitude											

*An "X" indicates a low rating.

TABLE D-6

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 6 Objectives	
Areas Rated	63	64
Appropriateness		
B.O.		
I.A. 1		X
I.A. 2	X	
A.T. 1		
A.T. 2		
A.T. 3		
Clarity		
B.O.		
I.A. 1		X
I.A. 2	X	
A.T. 1		
A.T. 2		
A.T. 3		
Effectiveness		X
Student Interest		
Student Attention		
Student Attitude		
Teacher Attitude		

*An "X" indicates a low rating.

TABLE D-7

TEACHER RATINGS* OF SCIENCE OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 7 Objectives						
Areas Rated	1	2	3	5	20	21	36
Appropriateness							
B.O.							
I.A. 1							
I.A. 2							
A.T. 1	X						
A.T. 2	X						
A.T. 3	X						
Clarity							
B.O.							
I.A. 1							
I.A. 2		X					
A.T. 1							
A.T. 2	X						
A.T. 3	X	X					
Effectiveness	X				X		
Student Interest							
Student Attention							
Student Attitude							
Teacher Attitude							

*An "X" indicates a low rating.

TABLE D-8

TEACHER RATINGS* OF SCIENCE OBJECTIVES MASTERED BY AT LEAST 80 PERCENT OF THE STUDENTS BUT NEED REVISION BASED ON THE HLD ANALYSIS

	Level 2 Objectives	Level 7 Objectives		
		Superstition	Laboratory Techinques	Matter
Areas Rated	32	8	26 27	35
Appropriateness				
B.O.				
I.A. 1				
I.A. 2				
A.T. 1				
A.T. 2				
A.T. 3				
Clarity				
B.O.			X	
I.A. 1				
I.A. 2				
A.T. 1				
A.T. 2				
A.T. 3				
Effectiveness				
Student Interest				
Student Attention				
Student Attitude				
Teacher Attitude				

*An "X" indicates a low rating.

TABLE D-9

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 1 Objectives					
	Capitalization			Punctuation		Sentence Structure
Areas Rated	1.1	1.2	1.3	2.1	2.7	1.1
Appropriateness						
B.O.					X	
I.A. 1	X				X	
I.A. 2					X	
A.T. 1	X				X	
A.T. 2	X	X		X	X	
A.T. 3	X		X	X	X	
Clarity						
B.O.					X	
I.A. 1					X	
I.A. 2	X				X	
A.T. 1	X				X	
A.T. 2	X			X	X	
A.T. 3	X			X	X	
Effectiveness	X				X	
Student Interest	X		X		X	
Student Attention	X		X	X	X	
Student Attitude	X		X	X	X	
Teacher Attitude					X	

*An "X" indicates a low rating.

TABLE D-10

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 2 Objectives							
	Capitalization			Punctuation				Sentence Structure
Areas Rated	1.4	1.5	1.6	2.2	2.3	2.4	2.5	1.3
Appropriateness								
B.O.		X			X			X
I.A. 1		X			X	X	X	X
I.A. 2	X	X				X	X	X
A.T. 1	X	X		X		X	X	X
A.T. 2		X			X	X	X	X
A.T. 3	X	X	X	X	X	X	X	X
Clarity								
B.O.		X					X	
I.A. 1		X				X	X	
I.A. 2		X				X	X	X
A.T. 1	X	X				X	X	
A.T. 2		X			X	X	X	
A.T. 3		X	X	X		X	X	
Effectiveness	X	X	X		X	X	X	X
Student Interest	X	X				X	X	
Student Attention		X				X	X	
Student Attitude		X		X		X		
Teacher Attitude						X	X	X

*An "X" indicates a low rating.

TABLE D-11

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 3 Objectives	
Areas Rated	Capitalization 1.7	Sentence Structure 1.1a
Appropriateness		
B.O.		
I.A. 1		
I.A. 2		
A.T. 1		
A.T. 2		
A.T. 3		
Clarity		
B.O.		
I.A. 1		
I.A. 2		
A.T. 1		
A.T. 2		
A.T. 3	X	
Effectiveness		
Student Interest		
Student Attention		
Student Attitude		
Teacher Attitude		

*An "X" indicates a low rating.

TABLE D-12

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 4 Objectives									
	Capitalization		Punctuation						Sentence Structure	
Areas Rated	1.9	1.10	2.8	2.13	2.14	2.15	2.16	2.18	1.9	1.10
Appropriateness										
B.O.	X		X	X		X				X
I.A. 1				X		X				
I.A. 2				X		X				
A.T. 1		X				X				X
A.T. 2				X		X			X	
A.T. 3	X	X	X	X	X	X				
Clarity										
B.O.		X								
I.A. 1	X	X	X	X		X				X
I.A. 2	X	X								X
A.T. 1		X								X
A.T. 2	X	X							X	X
A.T. 3	X	X				X				X
Effectiveness	X	X								
Student Interest		X								X
Student Attention		X		X						X
Student Attitude		X								
Teacher Attitude										

*An "X" indicates a low rating.

TABLE D-13

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 5 Objectives					
	Capitalization			Punctuation		
Areas Rated	1.11	1.12	1.13	2.19	2.20	2.21
Appropriateness						
B.O.		X	X	X	X	
I.A. 1	X		X	X	X	
I.A. 2	X	X	X	X	X	
A.T. 1		X	X	X	X	
A.T. 2		X	X	X	X	
A.T. 3	X	X	X	X	X	
Clarity						
B.O.	X	X		X	X	
I.A. 1		X	X	X	X	
I.A. 2	X	X	X	X	X	
A.T. 1		X	X	X	X	
A.T. 2			X	X	X	
A.T. 3	X	X	X	X	X	
Effectiveness	X	X	X	X		
Student Interest			X		X	
Student Attention			X			
Student Attitude			X			
Teacher Attitude			X			

*An "X" indicates a low rating.

TABLE D-14

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 6 Objectives					
	Punctuation					Letters and Forms
Areas Rated	2.23	2.24	2.25	2.26	2.27	3.1
Appropriateness						
B.O.	X				X	
I.A. 1	X				X	
I.A. 2		X			X	
A.T. 1	X	X			X	
A.T. 2	X				X	
A.T. 3	X				X	
Clarity						
B.O.		X		X		
I.A. 1		X	X	X		
I.A. 2	X	X		X		
A.T. 1		X			X	
A.T. 2		X			X	
A.T. 3		X			X	
Effectiveness	X	X	X	X	X	
Student Interest	X			X	X	
Student Attention					X	
Student Attitude	X					
Teacher Attitude					X	

*An "X" indicates a low rating.

TABLE D-15

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 7 Objectives					
	Parts of Speech					
Areas Rated	1	3	4	5	6a	6b
Appropriateness						
B.O.			X	X		
I.A. 1		X	X	X	X	
I.A. 2		X	X	X	X	X
A.T. 1		X			X	
A.T. 2		X	X	X		X
A.T. 3		X	X	X		X
Clarity						
B.O.	X	X	X	X	X	X
I.A. 1	X	X	X	X	X	X
I.A. 2		X	X	X	X	X
A.T. 1	X	X	X	X	X	X
A.T. 2	X	X	X	X		X
A.T. 3	X	X	X	X	X	X
Effectiveness	X	X	X	X		X
Student Interest		X	X	X	X	X
Student Attention		X	X	X	X	X
Student Attitude		X	X	X	X	X
Teacher Attitude			X	X		

*An "X" indicates a low rating.

TABLE D-16

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 8 Objectives					
	Parts of Speech	Punctuation			Spelling	
Areas Rated	11	4	5	7	4	5
Appropriateness						
B.O.						
I.A. 1					X	
I.A. 2						
A.T. 1						
A.T. 2					X	
A.T. 3						
Clarity						
B.O.						
I.A. 1						
I.A. 2						
A.T. 1						
A.T. 2						
A.T. 3						
Effectiveness						
Student Interest						
Student Attention						
Student Attitude						
Teacher Attitude						

*An "X" indicates a low rating.

TABLE D-17

TEACHER RATINGS* OF THE LANGUAGE ARTS/ENGLISH OBJECTIVES SUCCESSFULLY COMPLETED BY LESS THAN EIGHTY PERCENT OF THE STUDENTS

	Level 9 Objectives				
	Punctuation			Spelling	Pronouns
Areas Rated	9	10	11	6	7
Appropriateness					
B.O.		X			X
I.A. 1	X	X			X
I.A. 2	X	X			X
A.T. 1	X	X			X
A.T. 2	X	X			X
A.T. 3	X	X			X
Clarity					
B.O.		X			X
I.A. 1	X	X			X
I.A. 2	X	X			X
A.T. 1	X	X			X
A.T. 2	X	X	X		X
A.T. 3	X	X	X		X
Effectiveness	X	X	X		X
Student Interest	X	X	X		X
Student Attention	X	X	X	X	X
Student Attitude	X	X		X	X
Teacher Attitude	X				X

*An "X" indicates a low rating.

APPENDIX E

SMOG VALUES

TABLE E-1

SMOG VALUES FOR SCIENCE OBJECTIVES THAT WERE MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Mastered by 80% of the Students		SMOG GRADE [1]							
				Instructional Activities				Assessment Tasks			
				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	21	13	62%	5	5	5.0	0.0	3	5	4.3	0.5
2	11	3	27%	4	4	4.0	0.0	5	5	5.0	0.0
3	7	3	43%	-	-	-	-	3	6	4.6	0.9
4	6	0	0%								
5	11	0	0%								
6	3	1	33%	4	4	4.0	0.0	4	4	4.0	0.0
7 (SSU)	10	6	60%	-	-	-	-	4	6	4.8	0.6
7 (LTE)	21	19	90%	5	5	5.0	0.0	3	6	4.6	0.6
7 (MAT)	7	6	86%	-	-	-	-	3	5	4.5	0.6

1 The SMOG grade, the absolute value of three (3) plus the square root of the total number of polysyllabic words, is computed only when there is the presence of material to be read by students.

Note: SMOG Grades were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE E-2

SMOG VALUES FOR SCIENCE OBJECTIVES THAT WERE NOT MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Not Mastered by 80% of the Students		SMOG GRADE [1]							
				Instructional Activities				Assessment Tasks			
				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	21	8	38%	6	6	6.0	0.0	3	4	3.7	0.5
2	11	8	73%	-	-	-	-	3	5	3.7	0.6
3	7	4	57%	-	-	-	-	3	6	4.2	0.8
4	6	6	100%	5	5	5.0	0.0	3	6	4.8	0.9
5	11	11	100%	7	7	7.0	0.0	3	7	4.7	0.9
6	3	2	67%	6	6	6.0	0.0	5	6	5.3	0.5
7 (SSU)	10	4	40%	-	-	-	-	3	6	4.1	1.0
7 (LTE)	21	2	10%	-	-	-	-	4	6	4.8	1.0
7 (MAT)	7	1	14%	-	-	-	-	3	5	4.7	0.6

1 The SMOG grade, the absolute value of three (3) plus the square root of the total number of polysyllabic words, is computed only when there is the presence of material to be read by students.

Note: SMOG Grades were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE E-3

SMOG VALUES FOR LANGUAGE ARTS/ENGLISH OBJECTIVES
MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS
BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Mastered by 80% of the Students		SMOG GRADE[1] Instructional Activities				Assessment Tasks			
				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	6	0	0%								
2	9	1	11%	3	3	3.0	0.0	4	4	4.0	0.0
3	11	9	82%	3	4	3.2	0.4	3	5	3.9	0.8
4	11	1	9%	3	5	4.0	1.4	3	5	4.0	1.0
5	7	1	14%	4	4	4.0	0.0	4	4	4.0	0.0
6	10	4	40%	5	6	5.5	0.7	5	6	5.5	0.5
7	12	6	50%	4	6	4.9	0.9	3	6	4.6	0.9
8	15	9	60%	4	7	5.6	1.0	3	6	5.1	0.9
9	6	1	17%	6	6	6.0	0.0	5	6	5.3	0.6

1 The SMOG grade, the absolute value of three (3) plus the square root of the total number of polysyllabic words, is computed only when there is the presence of material to be read by students.

Note: SMOG Grades were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE E-4

SMOG VALUES FOR LANGUAGE ARTS/ENGLISH OBJECTIVES
THAT WERE NOT MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS
BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Not Mastered by 80% of the Students		SMOG GRADE [1]							
				Instructional Activities				Assessment Tasks			
				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	6	6	100%	3	5	3.6	0.9	3	4	3.5	0.5
2	9	8	89%	3	5	3.4	0.7	3	5	4.3	0.7
3	11	2	18%	4	5	4.5	0.7	4	5	4.5	0.7
4	11	10	91%	3	6	4.4	1.2	3	6	4.4	1.2
5	7	6	86%	3	6	4.1	1.1	3	6	4.2	1.1
6	10	6	60%	5	5	5.0	0.0	5	6	5.4	0.5
7	12	6	50%	3	7	5.3	1.3	3	7	5.5	1.1
8	15	6	40%	4	10	5.7	2.1	3	8	5.6	1.4
9	6	5	83%	3	7	5.5	1.9	3	7	5.6	1.0

1 The SMOG grade, the absolute value of three (3) plus the square root of the total number of polysyllabic words is computed only when there is the presence of material to be read by students.

Note: SMOG Grades were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

APPENDIX F

PUISSANCE VALUES

TABLE F-1

PUISSANCE VALUES FOR SCIENCE OBJECTIVES THAT WERE MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Mastered by 80% of the Students		PUISSANCE INDEX[1]											
				Behavioral Objective				Instructional Activities				Assessment Tasks			
				Range				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	21	13	62%	2	9	4.3	1.9	1	12	4.0	2.4	2	9	3.5	1.8
2	11	3	27%	2	3	2.3	0.6	3	6	4.0	1.5	3	6	4.1	1.2
3	7	3	43%	3	4	3.7	0.6	4	9	5.5	2.0	4	15	5.8	3.6
4	6	0	0%												
5	11	0	0%												
6	3	1	33%	12	12	12.0	0.0	9	12	10.5	2.1	2	3	2.3	0.6
7 (SSU)	10	6	60%	2	15	7.7	5.8	1	15	8.8	5.5	2	15	7.7	5.5
7 (LTE)	21	19	90%	2	12	6.9	4.0	1	15	7.7	4.4	1	12	7.1	4.4
7 (MAT)	7	6	86%	3	12	6.7	4.3	1	12	7.0	4.6	1	12	5.8	4.7

1 The lowest possible Puissance Index value is one (1) and the highest value is fifteen (15).

Note: Puissance indexes were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE F-2

PUISSANCE VALUES FOR SCIENCE OBJECTIVES THAT WERE NOT MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Not Mastered by 80% of the Students		PUISSANCE INDEX[1]											
				Behavioral Objective				Instructional Activities				Assessment Tasks			
				Range				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	21	8	38%	3	8	4.6	1.8	2	12	3.4	2.7	2	9	4.4	2.6
2	11	8	73%	2	12	4.4	3.4	1	10	4.1	2.7	2	12	4.9	2.7
3	7	4	57%	3	12	5.6	4.2	4	10	6.8	3.0	2	6	3.8	1.3
4	6	6	100%	3	12	6.8	3.5	3	9	5.5	2.8	2	9	6.1	2.7
5	11	11	100%	3	9	6.8	2.6	2	9	5.3	2.0	3	9	5.9	1.8
6	3	2	67%	12	12	12.0	0.0	12	12	12.0	0.0	2	6	3.3	1.6
7 (SSU)	10	4	40%	1	9	3.5	3.8	1	9	3.4	2.8	1	9	2.6	2.5
7 (LTE)	21	2	10%	6	12	9.0	4.2	4	12	8.0	4.6	2	12	7.3	5.2
7 (MAT)	7	1	14%	12	12	12.0	0.0	12	12	12.0	0.0	4	12	9.3	4.6

1 The lowest possible Puissance Index value is one (1) and the highest value is fifteen (15).

Note: Puissance indexes were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE F-3

PUISSANCE VALUES FOR LANGUAGE ARTS/ENGLISH OBJECTIVES THAT WERE MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Mastered by 80% of the Students		PUISSANCE INDEX[1]											
				Behavioral Objective				Instructional Activities				Assessment Tasks			
				Range				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	6	0	0%												
2	9	1	11%	3	3	3.0	0.0	3	6	4.5	2.1	3	4	3.3	0.6
3	11	9	82%	3	9	6.0	2.1	1	12	5.2	3.3	3	12	5.9	2.8
4	11	1	9%	4	4	4.0	0.0	6	9	7.5	2.1	9	9	9.0	0.0
5	7	1	14%	4	4	4.0	0.0	3	4	3.5	0.7	3	15	8.0	6.2
6	10	4	40%	6	9	6.8	1.5	2	6	4.1	1.5	3	9	5.9	1.8
7	12	6	50%	1	12	4.5	4.0	1	9	3.6	2.3	1	12	5.1	4.1
8	15	9	60%	4	12	6.1	2.8	1	9	5.1	2.7	2	12	5.9	3.1
9	6	1	17%	2	2	2.0	0.0	1	2	1.5	0.7	1	2	1.7	0.6

1 The lowest possible Puissance Index value is one (1) and the highest value possible is fifteen (15).

Note: Puissance indexes were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

TABLE F-4

PUISSANCE VALUES FOR LANGUAGE ARTS/ENGLISH OBJECTIVES THAT WERE NOT MASTERED BY AT LEAST EIGHTY PERCENT OF THE STUDENTS BY LEVELS AND BY INSTRUCTIONAL TRIAD COMPONENTS

Level	Total Number of Objectives	Objectives Not Mastered by 80% of the Students		PUISSANCE INDEX[1]											
				Behavioral Objective				Instructional Activities				Assessment Tasks			
				Range				Range				Range			
		Number	Percent	Low	High	Mean	S.D.	Low	High	Mean	S.D.	Low	High	Mean	S.D.
1	6	6	100%	2	12	6.8	4.7	1	12	4.8	3.8	2	15	6.8	4.7
2	9	8	89%	3	12	6.0	4.2	3	12	4.5	2.7	3	15	6.0	3.4
3	11	2	18%	6	12	9.0	4.2	4	6	5.0	1.2	4	15	6.3	4.3
4	11	10	91%	3	12	6.7	3.6	3	12	6.4	3.2	3	15	7.0	4.1
5	7	6	86%	3	12	8.5	4.0	3	12	6.3	3.3	3	15	8.7	4.8
6	10	6	60%	3	9	6.0	2.9	1	12	5.5	3.4	3	12	5.7	3.3
7	12	6	50%	4	12	5.3	3.3	1	12	4.5	3.9	2	12	4.7	3.7
8	15	6	40%	2	12	4.5	4.0	1	9	3.3	2.4	2	12	4.6	3.6
9	6	5	83%	3	12	7.8	4.0	1	9	4.2	2.7	3	12	6.1	3.3

1 The lowest possible Puissance Index value is one (1) and the highest value possible is fifteen (15).

Note: Puissance indexes were computed by staff in the Division of Research and Evaluation and therefore may differ from those computed by the curriculum writers.

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APPENDIX G

PERCENT OF ACQUISITION OF
LANGUAGE ARTS/ENGLISH OBJECTIVES
BY CATEGORY

FIGURE G-1

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE CAPITALIZATION OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

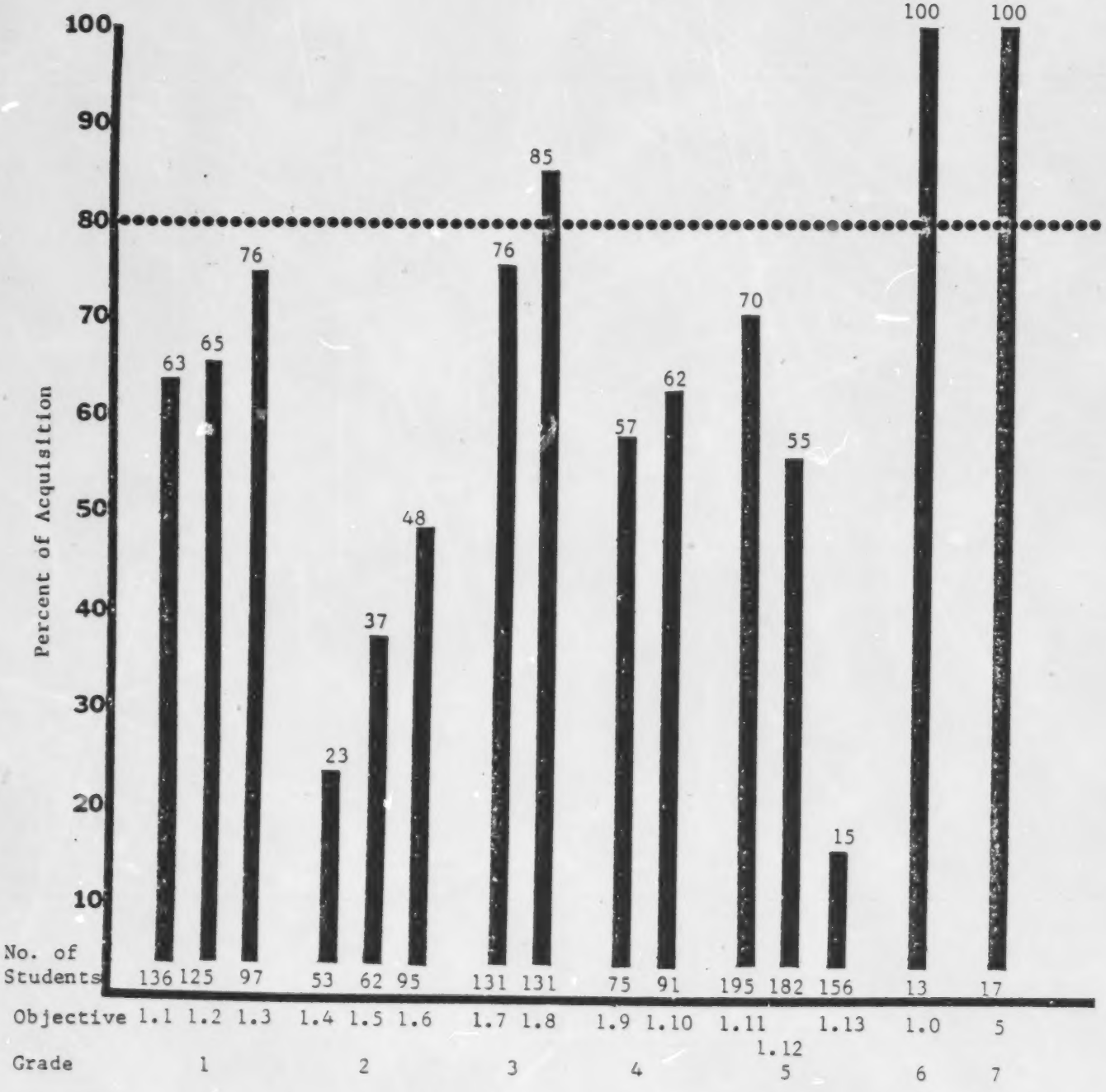


FIGURE G-2

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE PUNCTUATION OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

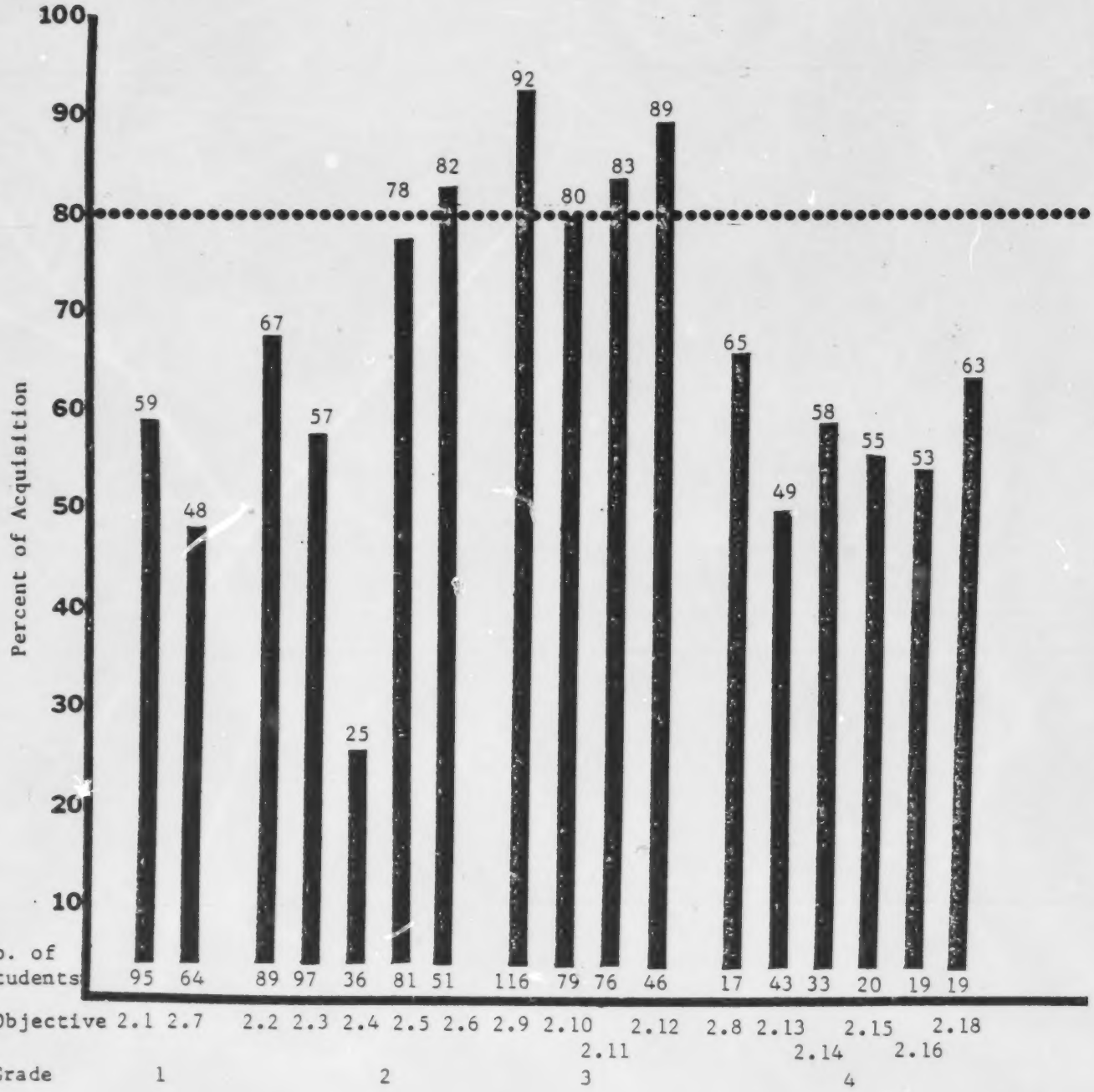


TABLE G-2 (continued)

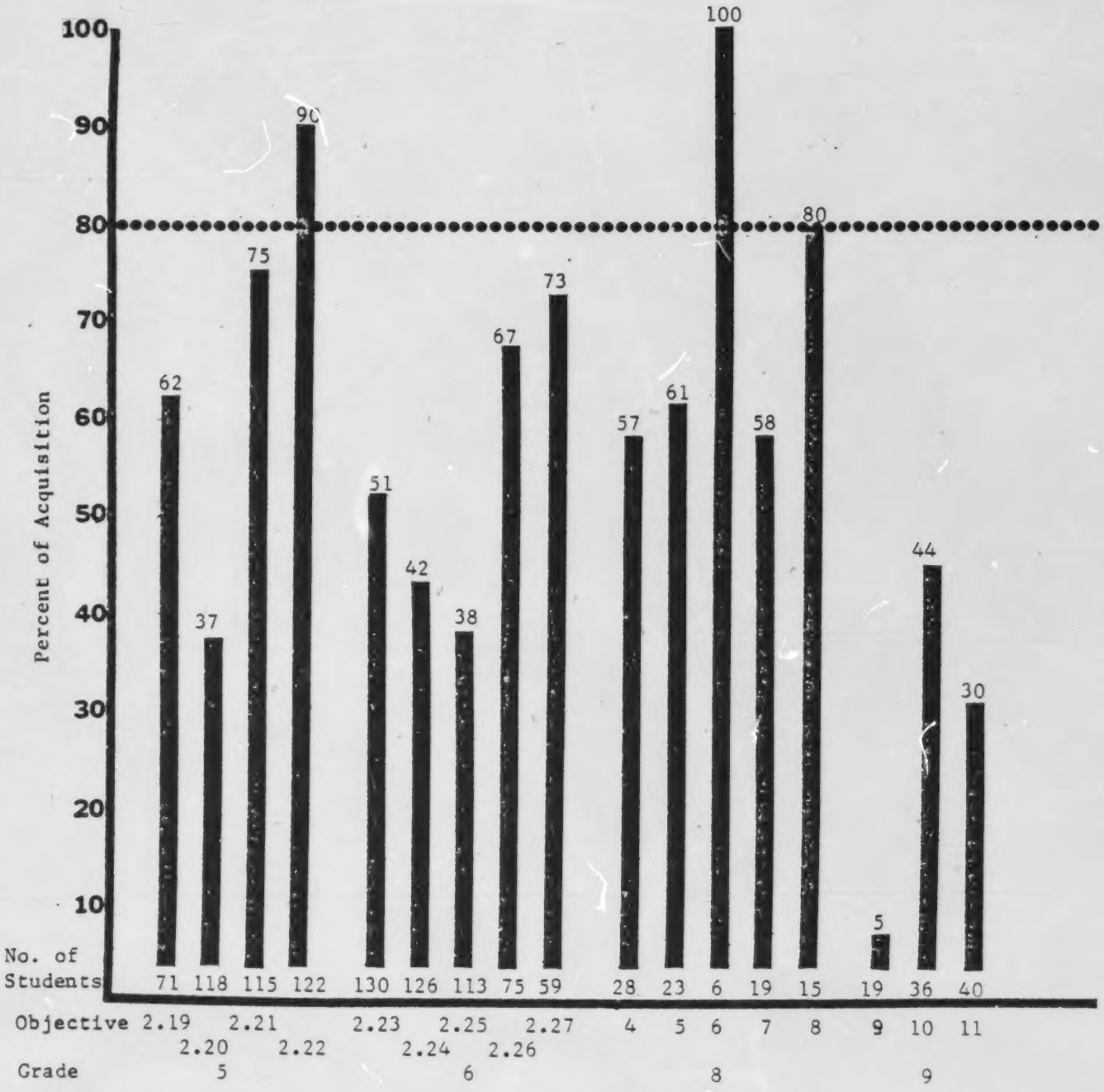


FIGURE G-3

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE SENTENCE STRUCTURE OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

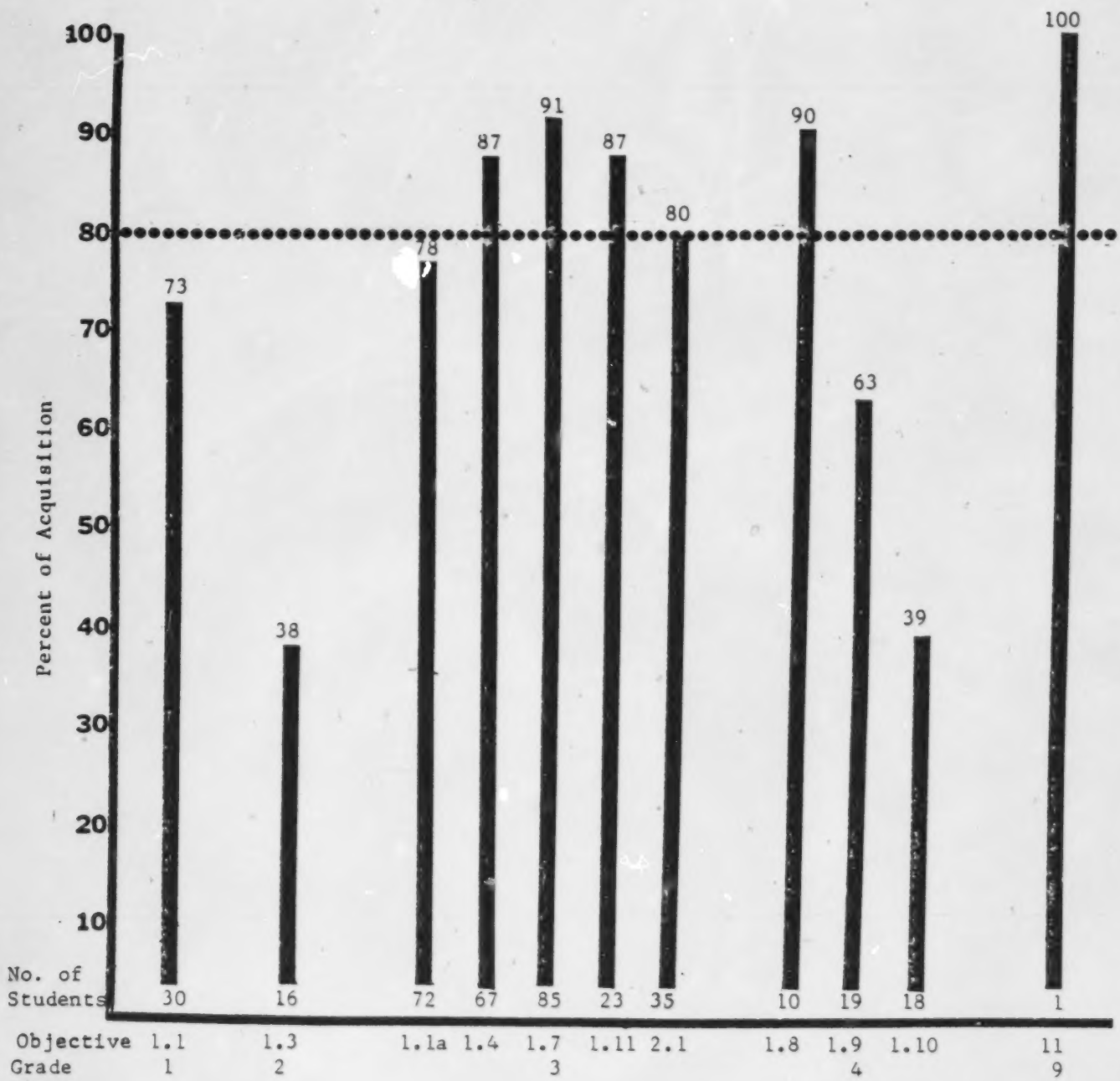


FIGURE G-4

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE LETTERS AND FORMS OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

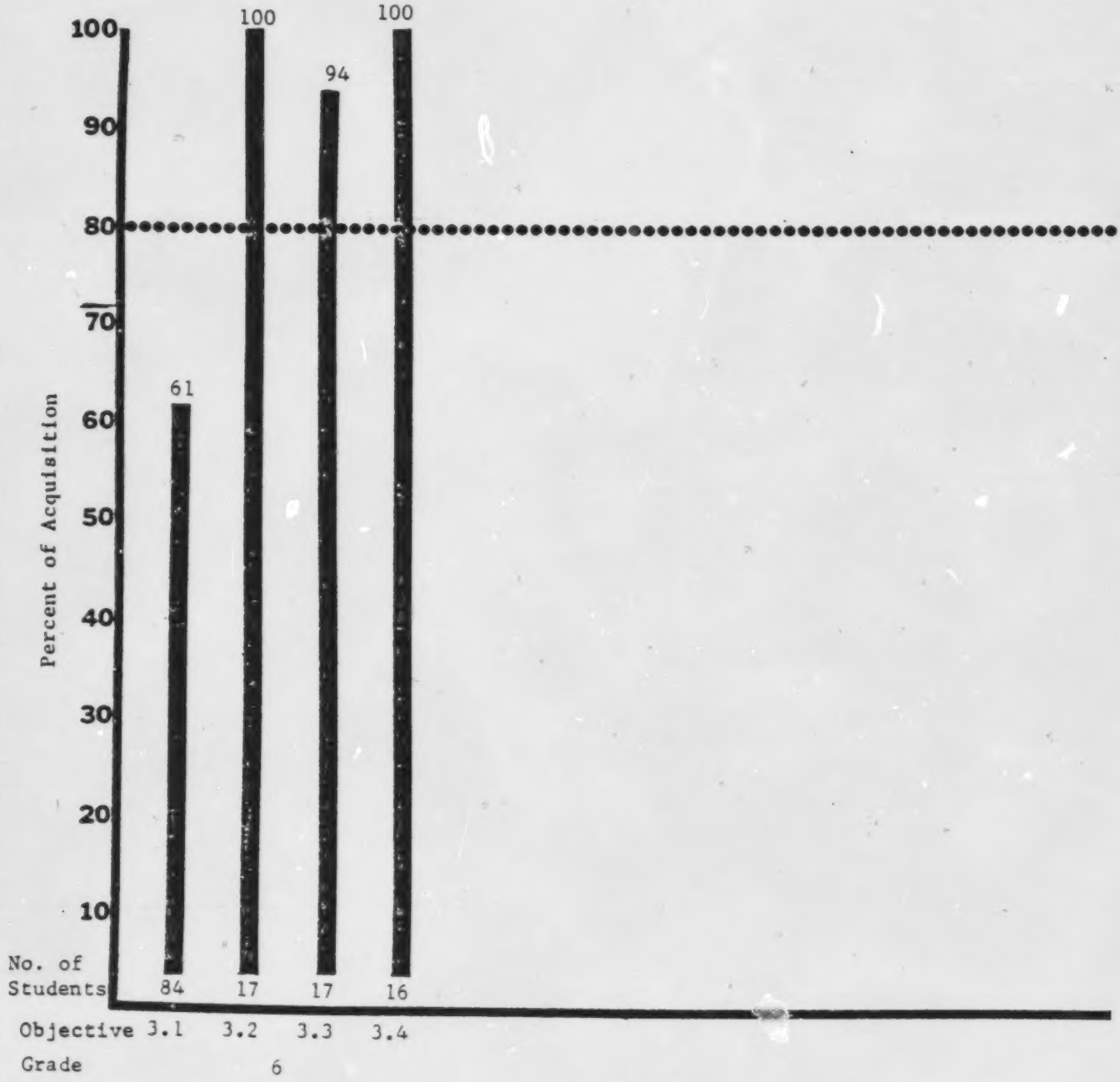


FIGURE G-5

PERCENT OF STUDENTS WHO SUCCESSFULLY COMPLETED THE PARTS OF SPEECH OBJECTIVES IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

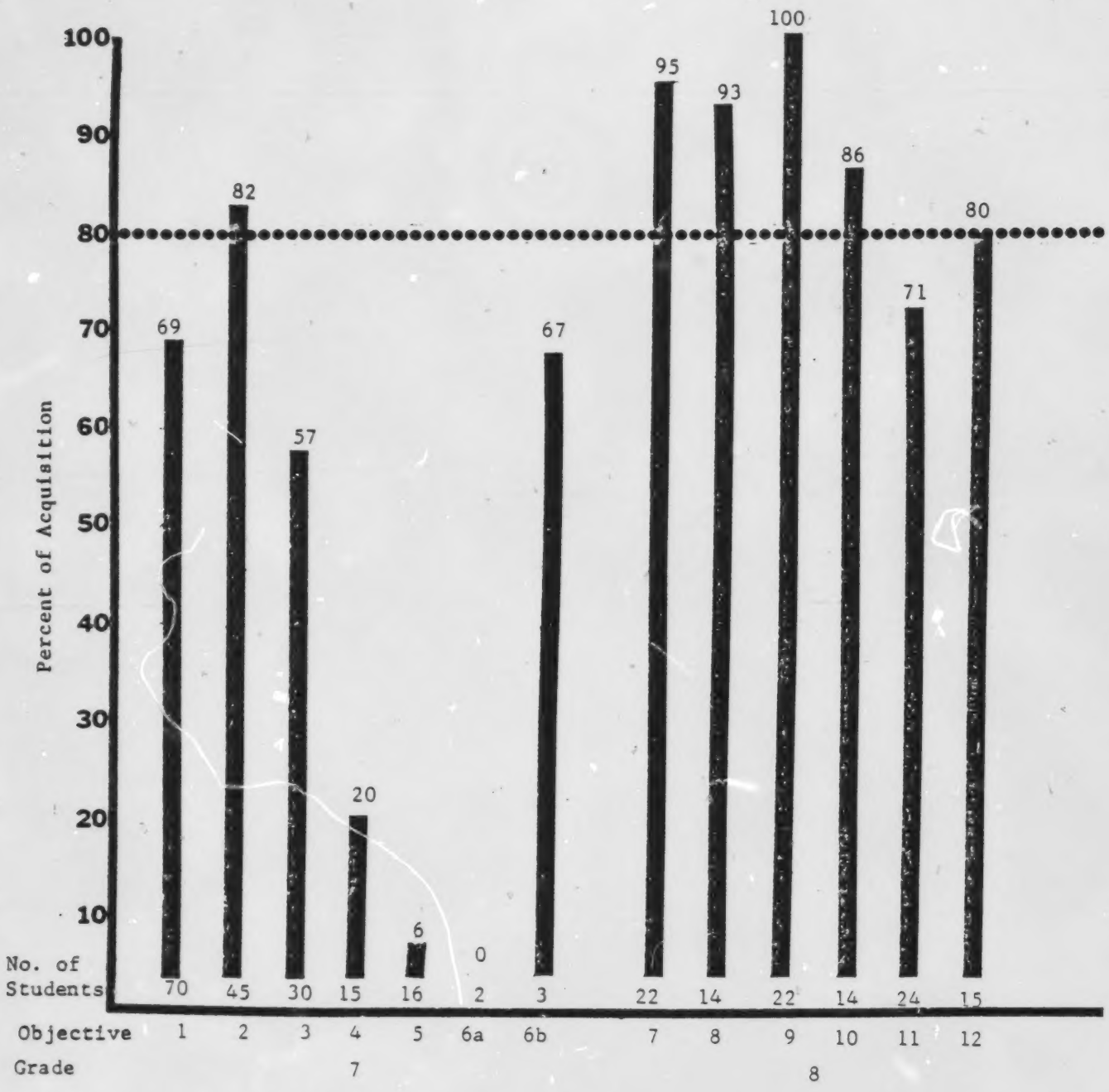


FIGURE G-6

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE PLURALS OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

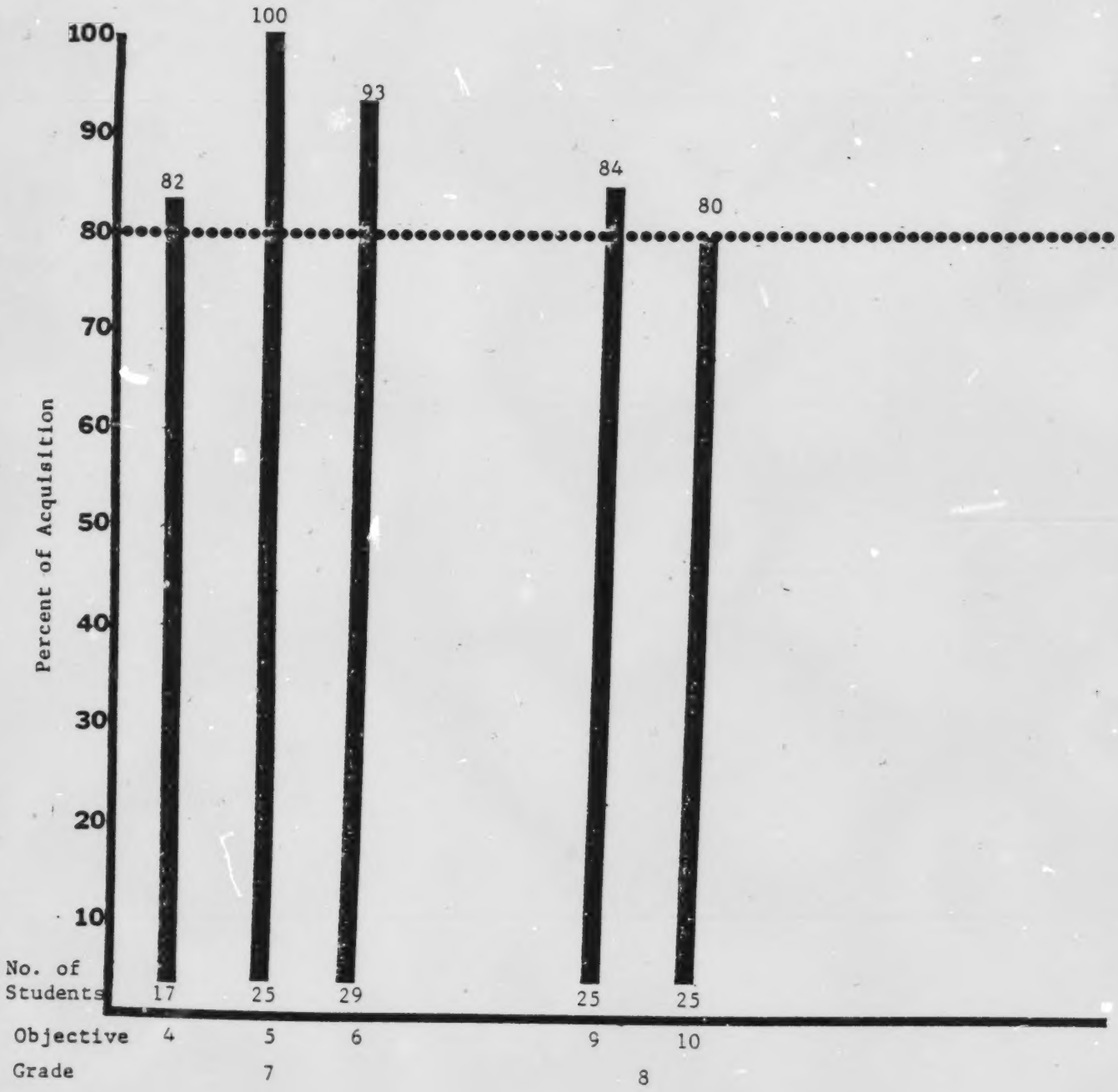


FIGURE G-7

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE SPELLING OBJECTIVES
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL

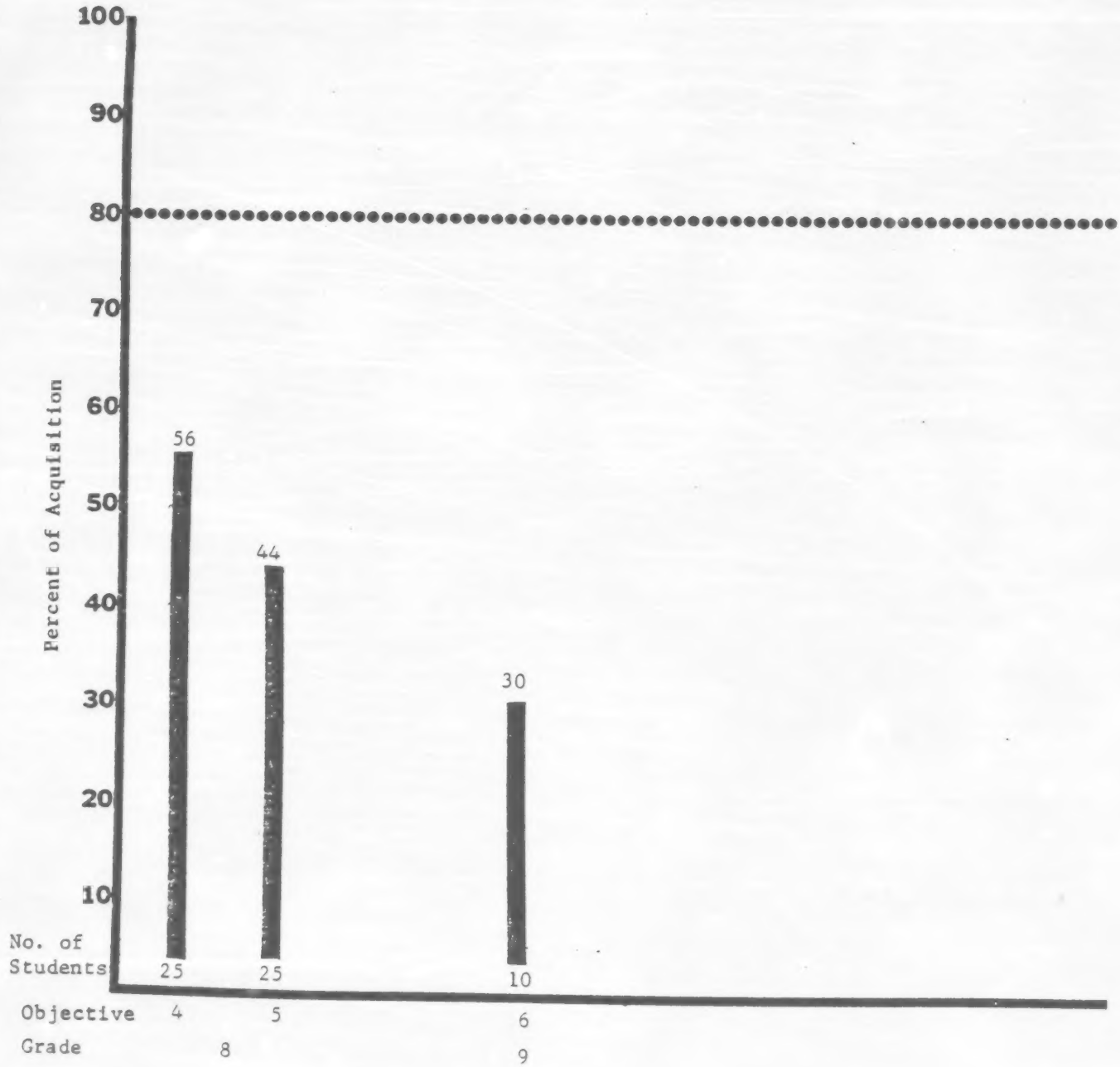
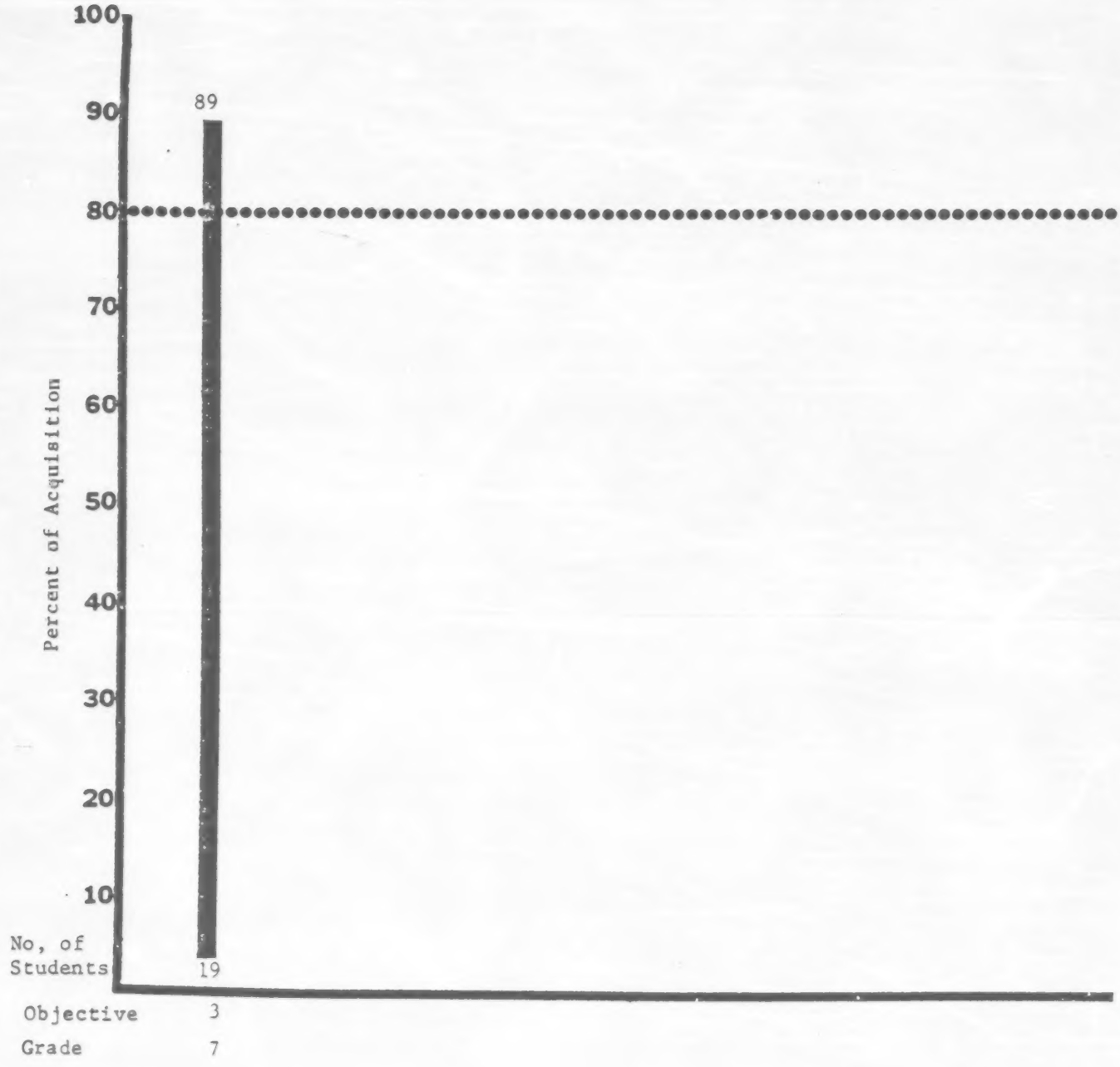


FIGURE G-8

PERCENT OF STUDENTS WHO SUCCESSFULLY
COMPLETED THE VERB USAGE OBJECTIVE
IN LANGUAGE ARTS/ENGLISH BY GRADE LEVEL



APPENDIX H

TOTAL AVERAGE TIME DEVOTED
TO EACH OBJECTIVE

TABLE H-1

TOTAL AVERAGE TIME TEACHERS DEVOTED TO LANGUAGE ARTS/ENGLISH BEHAVIORAL OBJECTIVES LEVELS 1-6

Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours
Capitalization		Capitalization		Capitalization		Capitalization		Capitalization		Capitalization	
1.1	7.3	1.4	7.1	1.7	5.9	1.9	5.2	1.11	11.9	1.0	6.1
1.2	7.8	1.5	5.0	1.8	4.1	1.10	5.8	1.12	7.9		
1.3	6.0	1.6	4.7					1.13	10.9		
Punctuation		Punctuation		Punctuation		Punctuation		Punctuation		Punctuation	
2.1	5.8	2.2	4.9	2.9	4.3	2.8	4.5	2.19	6.2	2.23	5.3
2.7	6.6	2.3	4.5	2.10	5.3	2.13	6.8	2.20	9.4	2.24	6.1
		2.4	4.1	2.11	5.4	2.14	6.6	2.21	6.2	2.25	4.7
		2.5	4.1	2.12	5.6	2.15	10.2	2.22	6.7	2.26	4.5
		2.6	4.7			2.16	8.1			2.27	10.1
						2.18	9.5				
Sentence Structure		Sentence Structure		Sentence Structure		Sentence Structure				Letters and Forms	
1.1	12.9	1.3	4.8	1.1a	5.6	1.8	3.8			3.1	5.5
				1.4	7.8	1.9	6.0			3.2	3.5
				1.7	7.2	1.10	4.1			3.3	13.3
				1.11	6.4					3.4	33.1
				2.1	5.1						

TABLE H-2

TOTAL AVERAGE TIME TEACHERS DEVOTED TO
LANGUAGE ARTS/ENGLISH BEHAVIORAL OBJECTIVES LEVELS 7-9

Level 7		Level 8		Level 9	
Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours
Capitalization					
5	*				
		Punctuation		Punctuation	
		4	6.2	9	3.9
		5	9.2	10	5.8
		6	9.3	11	5.9
		7	11.3		
		8	19.3		
		Spelling		Spelling	
		4	4.2	6	5.2
		5	8.0		
Plurals		Plurals		Sentence Structure	
4	4.1	9	6.1	11	31.1
5	5.2	10	9.6		
6	5.6				
Parts of Speech		Parts of Speech		Pronouns	
1	8.3	7	7.5	7	8.8
2	8.9	8	13.0		
3	4.6	9	10.2		
4	5.5	10	12.1		
5	6.0	11	6.8		
6a	5.5	12	9.5		
6b	5.2				
Verbs					
3	34.3				

* Time not recorded.

TOTAL AVERAGE TIME TEACHERS DEVOTED TO SCIENCE BEHAVIORAL OBJECTIVES LEVELS 1-6

Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours	Behavioral Objectives	Hours
1	8.1	24	4.2	35	9.4	42	6.2	48	17.6	62	8.3
2	6.2	25	8.4	36	5.0	43	10.7	49	4.0	63	9.0
3	15.6	26	4.8	37	4.1	44	6.0	50	6.9	64	6.6
4	4.5	27	6.1	38	4.8	45	5.9	51	6.1		
5	4.9	28	6.1	39	5.1	46	18.3	52	8.3		
6	5.0	29	5.1	40	6.6	47	16.2	53	3.5		
7	5.9	30	5.2	41	7.4			54	4.2		
8	5.6	31	6.5					55	4.6		
9	5.4	32	9.3					56	5.8		
10	4.0	33	6.2					57	8.6		
11	4.9	34	6.5					58	9.5		
12	7.7										
13	6.0										
14	3.8										
15	3.8										
16	4.5										
17	4.3										
19	4.0										
21	4.3										
22	5.1										
23	4.0										

TABLE H-4

TOTAL AVERAGE TIME TEACHERS DEVOTED TO
SCIENCE BEHAVIORAL OBJECTIVES LEVEL 7

Superstition Behavioral Objectives	Hours	Laboratory Techniques Behavioral Objectives	Hours	Matter Behavioral Objectives	Hours
1	4.8	11	4.9	32	3.7
2	5.9	12	5.6	33	3.8
3	10.5	13	5.0	34	4.0
4	7.8	14	4.5	35	3.5
5	6.7	15	4.1	36	3.8
6	6.4	16	3.5	37	3.5
7	4.4	17	4.9	38	4.5
8	3.8	18	3.8		
9	3.9	19	6.7		
10	4.4	20	4.5		
		21	4.5		
		22	5.2		
		23	3.5		
		24	3.5		
		25	3.8		
		26	7.1		
		27	4.3		
		28	4.1		
		29	5.0		
		30	4.1		
		31	32.7		

APPENDIX I

GLOSSARY

VALIDATION REPORT GLOSSARY

This glossary presents the meanings of terms relative to the Competency-Based Curriculum as they are used in this report.

Adequacy Ratio - A ratio which tests the implication that acquisition of all subordinate behaviors implies, after instruction, acquisition of the terminal behavior. The adequacy ratio is the ratio of all students who correctly answer both the subordinate and terminal behaviors to the total number of students answering all subordinate behavior(s) correctly. Symbolically, it can be stated as

$$\frac{\text{freq. } (1,1)}{\text{freq. } (1,1) + \text{freq. } (0,1)}$$

where the first number in the ordered pair indicates mastery (1) or nonmastery (0) of the terminal behavior and the second number indicates mastery or nonmastery of the subordinate behaviors.

Assessment Task (A.T.) - Tasks students must complete successfully to demonstrate the acquisition of the competency called for in the behavioral objective.

Behavioral Objective (B.O.) - A statement in terms of what new behavior the student will have mastered as a result of participating in the instructional activities.

Category - A subdivision of a strand which identifies the content area in which a given skill (competency) is being used.

Competency - The ability of an individual to perform a task at a required or specified level of proficiency.

Competency-Based Curriculum (CBC) - An individualized sequential instructional program based on the use of behavioral objectives for which performance criteria have been established.

Completeness Ratio - A ratio which measures the strength of the hypothesis of learning dependency. This coefficient is the ratio of all students who correctly answer both the subordinate and terminal behaviors to the total number of students whose acquisition or nonacquisition of the subordinate behaviors determines the acquisition or nonacquisition of the terminal behavior. Symbolically it can be stated as

$$\frac{\text{freq. } (1,1)}{\text{freq. } (1,1) + \text{freq. } (0,0)}$$

where the first number in the ordered pair indicates mastery (1) or nonmastery (0) of the terminal behavior and the second number indicates mastery or nonmastery of the subordinate behaviors.

Component - An integral part of a larger entity or system which functions independently, but which exists to aid the larger system in achieving its goals and objectives.

Consistency Ratio - A ratio which tests the implication that acquisition of the terminal behavior implies acquisition of all subordinate behaviors. The consistency ratio is the ratio of all students who correctly answered both the subordinate and terminal behaviors to the total number of students answering the terminal behavior correctly. Symbolically, it can be stated as

$$\frac{\text{freq. } (1,1)}{\text{freq. } (1,1) + \text{freq. } (1,0)}$$

where the first number in the ordered pair indicates mastery (1) or nonmastery (0) of the terminal behavior and the second number indicates mastery or nonmastery of the subordinate behaviors.

Continuum	- An orderly, planned sequence of learning experiences, Pre-K through 12, planned for and participated in by a learner or group of learners, which is intended to lead to the acquisition of a predetermined list of competencies arranged to reflect increasingly more complex skills.
Criterion	- A standard of performance.
Hierarchy	- An arrangement of behavioral objectives from simple to complex, which, when mastered in sequence, leads to the mastery of a specific skill.
Hypothesis of Learning Dependency (HLD)	- A prediction of the dependent relationship of a terminal objective to its subordinate objective(s).
Instructional Activity (I.A.)	- An activity provided to enable the student to gain competency called for in the behavioral objective.
Instructional Triad	- An arrangement of one behavioral objective, two instructional activities, and three assessment tasks with performance agreement among all three components.
Mastery	- The ability to demonstrate a specific skill at or above a previously established criterion level.
Objective Code	- An eleven digit alphanumeric code developed to identify objectives by curriculum area, strand, category, and number.
Percent of Acquisition	- A percentage of students in the validation study who demonstrated mastery of a specific objective by successfully completing all three assessment tasks.
Performance Criteria	- A minimal standard of performance a student must meet in order to demonstrate acceptable competence or mastery.
Puissance Index	- A power structure test to determine the difficulty level of each component of an instructional triad.

Rationale	- An explanation of the underlying and controlling principles of belief which determine, and consequently reflect, the curriculum of the school system.
Skills	- Competencies acquired by observation, study or experience in mental, emotional, and/or physical performance which are required for the mastery of school work or other activity.
SMOG	- A readability formula for determining the reading complexity level of curriculum materials.
Strand	- A sequence of objectives in a given skill (competency).
Subordinate Objective	- A behavioral objective serving as a prerequisite to a more comprehensive behavioral (terminal) objective.
Terminal Objective	- The most comprehensive behavioral objective acquired after mastering the prerequisite objective(s).
Validation	- An independent verification of the compatibility and appropriateness of the instructional triads and learning hierarchies within the CBC approach.